The Builder.

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The Coloured Decoration of Churches.

PURSUING this subject,* which is one of especial interest with many of our readers, we must return a little chronologically. At Heading-ton Church, Oxfordshire, are found extensive and interesting traces of the original painting of late thirteenth century date. These original paintings were covered by no less than twenty-four coats of whitewash; and if these could have been peeled off entire, they would have supplied us with no less than six different series of wall-paintings of different dates. The earliest is that which we are about to describe; four others consisted of powderings of crosses, roses, and knots; the latest was of Tudor date,—we shall have occasion to refer to it in a later part of this paper. Of the original painting a great part of the entire scheme of colouring of the nave could be made out. In the arcade the arches were coloured red in the exterior chamfer, and yellow in the interior, with a scroll foliage pattern on the soffits, like that which will be seen under the windows in the drawing of the south wall. How the pillars and capitals and the spandrels between the arches were treated did not appear. Over the hood-moulding was a close masonry pattern in double red lines; and probably the rest of the spandrels were covered with single line masonry pattern. The walls were covered with decoration; that of a portion of the south wall is represented in the accompanying woodcut.† A scroll foliage pattern runs under the windows, and the space beneath this, which in other churches is frequently left unpainted, is here painted with a kind of imitation of hangings of narrow vertical stripes of different colours.

Drapery of similar character is very commonly found represented in illuminated MSS. of this period. The imitation of such hangings here suggests the possibility that the surbase of the walls, which is so frequently left unpainted, was intended to be draped with hangings. Above the band of foliage the wall is entirely painted,—a masonry pattern, of which the stones are yellow, the joists broad pink, with a centre line of white on the pink. A series of pictures are regularly arranged on the broad window splays, and other pictures are added on the wall spaces with an irregular arrangement, *i.e.*, not symmetrical with respect to the principal series, or to the wall spaces on which they are painted. The subjects of the series of paintings on the splays cannot all be made out satisfactorily: some of them seem to be incidents in the life of our Lord; but others intermixed with them seem to relate to other subjects; *e.g.*, on the left jamb of the first window the subjects seem to be the "Nativity," and the "Flight into Egypt," but those on the right jamb do not seem to belong to the same history, and are unintelligible. Again, the two upper pictures on the second window seem to be the "Slaughter of the Innocents," and the "Triumphal Entry into Jerusalem;" but the lower pictures, again, do not seem to relate to the same history, and are unintelligible. The heads, which are inserted to fill the triangular spaces in the upper part of the splays, are St. Peter and St. Paul in the first window, and a queen and a bishop, probably two saints, in the other. The east end of the nave had been entirely covered with painting. On the lower part the band of running foliage and the hangings of the south wall were continued. Above this the wall was divided by four horizontal stripes of red, on each of which was a row of half-coloured stars; the wall spaces between the stripes were produced with red stars. Over the round Norman chancel arch was painted a pointed arch of scroll foliage, on the upper part of which was a picture of the Majesty, viz., of our Lord seated, with kneeling figures adoring. We are indebted for the knowledge of these interesting paintings, and for the excellent drawings of them, from which our engravings are taken, to Mr. Herbert Hurst, of Enfield. An unusually complete series of paintings of the latter part of the thirteenth century was brought to light at St. John's Church, Winchester, in 1853, and was drawn and described by Mr. Baigent, in the Journal of the British Archæological Association for that year. On the north wall of the arch of the church the paintings reached from the roof to within 8 ft. of the ground, and extended over the whole length of the wall, interrupted only by the lancet windows. The different paintings were of unconnected subjects, and were not arranged symmetrically on the walls. Some were enclosed in a frame of marginal lines, others were not, and the blank spaces of the wall were irregularly powdered with crosses and other ornaments. First, beginning at the west end, came a grand "Doom," in three horizontal compartments, one over the other, painted with great care and in a greater variety of colours than usual—red, green, yellow, and pink. Over one of the lancets was a large circle, with two smaller circles on each side of it: in the larger circle a head of our Lord; in the four smaller circles the evangelistic symbols; and below—one on each side of the arch—two angels censing. In the next compartment is a Crucifixion, inclosed within a yellow border foliated at the corners. There is a figure on each side of the cross; but instead of the conventional SS. Mary and John, one figure is St. Francis, the other is a tonsured and cowled figure which we might have taken for St. Dominic but that his robe is red. Next to this, without any frame, is a "Crucifixion of St. Andrew," and then comes another window, over which is an angel distributing crowns. On the other side of the window is a "Virgin and Child," and then another angel kneeling and censing, but not towards the Virgin. The space of about 62 ft. between this and the last wall (which, perhaps, came within the screen of a chantry chapel) seemed not to have been painted. On the opposite wall of the same aisle there was one painting at the east end, and rather high up over a hagioscope and piscina in the respond wall which divides the chapel from the chancel. This was a very interesting painting, in excellent preservation, of the "Martyrdom of St. Thomas à Becket." Other paintings existed on the spandrels of the arcade between the aisle and church, and on the wall over it: their curious arrangement is represented in the woodcuts which illustrate Mr. Baigent's paper in the *Journal of the Archæological Association*, vol. ix. A vertical border of scroll foliage marks the commencement of the paintings at the west jamb of the rood door. A similar band of foliage runs over the points of the arches, and there is a series of paintings very much defaced and undecipherable in the long horizontal compartment between this band and the roof. Then the spandrels were occupied with other single subjects, of which one remained tolerably perfect, and is represented in the drawing. The way in which this subject is supported on the hands and head of a crowned sitting figure is very curious.

A series of paintings at Battle Church, Sussex, probably of early fourteenth century date, gives us other modes of arrangement. One series is on the clerestory wall, between the windows. The wall spaces, which are almost square, are divided by two vertical lines crossed by one horizontal line into six compartments each, and there is a subject in each compartment; there is also a saint painted on each of the window splays. The east end of the nave is also painted. The space between the tie-beam of the roof and a little above the spring of the chancel arch is divided into two long horizontal rows of saints under canopies. The wall-space above this, between the tie-beam and the rafters, is occupied by two subjects of the popular Triumph (or Dance) of Death. The paintings are executed in red outlines, with occasional flat tints of red and yellow.

In a chapel of Notre Dame des Pas, in the churchyard of St. Brelade, Jersey, which is interesting as an example of the detached chapels which used not unfrequently to exist in churchyards, there are some interesting paintings of the fourteenth century. The building itself is very plain, and devoid of architectural ornament; its plan is a simple parallelogram, with a plain Pointed vault. The paintings were apparently confined to this vault. Along the apex of the vault is a line of scroll foliage. Each side of the vault is divided into three long horizontal lines of painting, executed in red outlines with considerable artistic skill, on the ground of pale buff-tinted plaster, the subjects running continuously without separation, as in the Bayeux tapestry. On the north side the subjects, so far as they remain, seem to relate to the Passion of our Lord. Beginning at the west end, we have first the "Trial before Herod." Herod is sitting on a throne in the costume of one of our Royal Edwards, with a scroll above him, "Herodes Rex." Our Lord is between two soldiers in the costume of fourteenth century men-at-arms. The next subject is the "Binding of our Lord." The second row begins with the "Scourging;" next the "Bearing the Cross." The lower line of painting is obliterated. On the south side of the vault the subjects, so far as they remain, relate to the Nativity. Beginning at the west end, in the first subject is seen a portion of a royal figure, but the subject is so far obliterated as to be undecipherable. The next is an "Annunciation." At the west end of the chapel is a "St. Michael weighing Souls." The vacant spaces in the background between the figures are powdered with a very simple pattern consisting of five small circles.

When we come to the fifteenth century, there do not seem to be nearly so many wall paintings as in the fourteenth century, and many of them seem to be merely decorative. In very many instances, the original Early English and Decorated paintings have been washed over, and the walls covered entirely with powderings of roses, fleurs-de-lys, and other patterns. One of the most complete series of paintings of the time which has come under our notice, is that in the lady-chapel, Winchester Cathedral, which is of unusual merit, and in very good preservation. They occupy the space between the windows and the floor, and are arranged in two rows, framed in a painted architectural panelling: pillars divide the wall-space into compartments, with a flat cusped arch; each compartment is divided into two panels by a transom, and the upper angles of the lower panel are also rounded off into a flat arch. The subjects, which possess great artistic merit, appear to be scenes from some legendary story. They are engraved imperfectly in Carter's "Ancient Painting and Sculpture," and more accurately in the Winchester volume of the British Archæological Association. The piscina has its architectural features decorated with painting, and a subject painted at the back of its niche.

* See p. 724, *ante*.

† See p. 741.

On the south wall of Hadleigh Church, Essex (whose thirteenth century paintings have already been noticed), to the east of the south door was a large painting of St. George, rather finely designed and executed,—an unpublished drawing of it is in the collection of the Essex Archæological Society. The fine picture of the "Incredulity of St. Thomas," painted on one of the Norman piers at St. Alban's, has already been noticed. At St. Laurence's Church, Melcombe, near Banbury, opposite the north door, was a painting of the martyrdom of the patron saint. On the north wall of the nave were two horizontal rows of paintings which have been conjectured to represent the seven deadly sins. They are of the time of Henry VII.; drawings of them, which are, we believe, unpublished, lie before us.

At St. John's Church, Winchester, there were two or three figures (fig. 14, p. 740) well executed in black outline on white, and set in a red ground. From the same series of paintings we obtain one of our few examples of merely decorative wall-painting of this century. It is a powdering of alternate crowns and oak sprigs on a red ground * (fig. 15). Another wall pattern of leaves springing from ascending spiral stems we give in the woodcut from Beckley Church, Oxon† (fig. 16).

One of the most complete examples of this style of decoration we obtain from the fine late Perpendicular church of Great Coggeshall, Essex. "During the restoration of this church," says the Rev. Edward L. Cutts, in a paper read before the Royal Institute of British Architects, which we have already several times quoted, "I looked carefully for all indications of its original coloured decoration, and I think that its entire plan could be made out. The plan of the church is chancel and nave, with aisles running through from east to west, west tower, and north porch. Colour seems to have been very sparingly applied to the architecture. The walls generally seem to have been left unpainted, with only a line of red in the moulding round the edge of the window splays. The bell of the capitals of the pillars was coloured red. The arches across the chancel and its aisles had a few stripes of plain colour, chocolate, bright red, and yellow. The east walls of the chancel and aisles had been painted over with a tapestry-pattern of a character common about the reign of Henry VII., which pattern returned a short distance along the adjoining walls to form an enrichment above the altars." [We may here add that on the wall face to the left of the window of the north chancel aisle there were traces of a different tapestry-pattern, powdered with sprays of a flower with leaves like a wild anemone, which was also a common pattern at the same date.] "There was, moreover, a whole series of dedication crosses on the walls of the chancel aisles beneath the windows, all alike,—a cross patée within a circular rim, the cross dark red and the rim dirty grey (probably faded green). There were two under the windows of the north wall of the north chancel aisle, and one higher up on the right side of the east window of that aisle; one under the east window of the south chancel aisle, and four others under the windows in the south wall; in the absence of other paintings this series of crosses must have been conspicuous. It will be seen that there is very little painting indeed; and for that very reason I think it is worth noting, as a proof that in a fine, large, handsome church the system of decorative colour was sometimes of a very simple character. I presume the painted glass in the numerous and large windows afforded abundance of colour of the most brilliant kind, and it was desirable that the wall-spaces between should be left plain as a foil to the glass paintings, with only a line of colour here and there to give emphasis to the chief architectural features, and to carry the colour into the body of the building."

We may mention one example of groining decoration of this period; it is in the north chancel aisle of St. Alban's. The groining ribs are picked out with red; four rays of masonry pattern, of which the intersecting boss is the centre, extend into the spandrels of the vaulting, and across each ray is written a large *the* in what now looks like black, but may be discoloured red lead. The greater part of the painting of the fifteenth century is to be found on the woodwork which was so largely introduced during this period, viz., on rood-screens, roofs, pulpits, &c., and on tombs. It is generally much more elaborate in design and brilliant in colours, and more minutely finished, than the bold distemper paintings on the walls. It is a very extensive branch of the subject into which we have not space to enter; and we leave it untouched with the less regret that a considerable number of excellent examples of it are easily accessible in Mr. Blackburne's "Decorative Painting" and Mr. J. K. Colling's "Examples of Gothic Ornament."

The Tudor painting at Headington, Oxon (whose Early English painting has already been noticed), was unusually elaborate. The pillars had been painted in broad stripes of deep red and yellow, each 8 in. wide, from top to bottom. The capitals had dark red in the hollows, and a few red cinquefoils painted at intervals in the hollow of the bell. The chamfers of the arches were also red, and over the hood-moulding of the arches was an engrailed border in black, each point of the engrailing terminating in a rudely drawn trefoil. An example of this bordering will be seen over the south door, in the large engraving of the Headington Early English paintings. The same border was used over all the windows and doorways. The narrow piers between the windows on the south side had an ascending wavy line of black, branching at top into three flower-stalks, supporting three Tudor flowers, all black (fig. 17). All the window splays were crossed with diagonal bars in black outline, budding out at about every foot into semicircles and trefoils. Some black and red hangings to the left of the south door (over the "St. Christopher" in the drawing), seemed to belong to this period, but the chief decoration of the walls seemed to be black-letter texts, surrounded by red borders; in one instance the border consisted of a red stem, with green ivy leaves springing from it, which, however, was poor in execution and effect.

The Jacobean texts which were written on the walls, and which from the last style of mural decoration, often have ornamented borders, were found at Hadleigh Church and at Little Braxted Church and at Kelvedon Church, all in the county of Essex. The accompanying woodcut (fig. 18) is from an ornamental border on the wall, a little above the level of the seats, which formed part of this Tudor decoration at Kelvedon. We may note here that the Lord's Prayer, the Creed, and the Ten Commandments, as originally written in obedience to the Canon, still remain in some cases, at the east end of the church, *i.e.*, of the nave, *e.g.*, at Bradfield, Essex, where they are written on a boarding (probably original) over the rood beam. The latest text we have met with is in Langdon Church, Essex, of the time of the Restoration of the Monarchy and the Church after the Commonwealth; it runs along the west side of the rood beam, over which the arms of King Charles II. had been put up; and the text chosen to be thus placed in sight of all the people is significant:—"My son, feare God and honour the King, and meddle not with them that are given to change."

* "Journal of British Archæological Association."
† "Archæological Journal," iv., 257.

THE GREAT EXPLOSION; AND THE BREACH IN THE RIVER-EMBANKMENT.

Warnings of danger to this metropolis from the storage of large quantities of gunpowder, even at places so distant as Purfleet, Plumstead, or Belvedere, have been occasionally uttered,—though they have not received the same attention as those referring to the accumulation of petroleum and other combustibles, in buildings amongst the streets of London. But the magnitude of the danger has been demonstrated since our last number appeared; and consequences hitherto unapprehended, involving, from the particular explosion, the inundation of a large area of valuable reclaimed land, and that of the extensive low-level inhabited districts in the south or south-east of London itself, besides injury and delay to the sewerage works, have been averted only through a most fortuitous conjuncture of circumstances, the presence of mind and the skill of one or two individuals, and the immediate energy and laborious exertions of a great force of men.

On Saturday morning last, at about twenty minutes before seven o'clock, there occurred at a certain spot on the southern bank of the Thames, near Belvedere, and distant about one mile above the church of Erith, and the same distance below the reservoir and Outfall of the whole Main-drainage of that side of the river, an explosion of a quantity of gunpowder which appears to have far exceeded in the amount, that of any explosion in time of war, whilst the sound and concussion reached to places at a distance of eighty, ninety, or approaching one hundred miles. The quantity is estimated to have been 1,040 barrels of 100 lb. each, or in all nearly 46½ tons. It was contained in two magazines, which stood close behind the embankment or river-wall of the Thames, and in two barges outside; but the quantity that was in one of the buildings formed a considerable portion of the whole, and amounted to 750 barrels. The destruction of life, or personal injuries, by the explosion itself, fell almost exclusively upon the few individuals, and their families, who were in charge of the magazines, or on board the barges, or engaged in the work of loading or unloading; and it may not have exceeded about twenty individuals, five of whom are dead whilst we write, and five are "missing" or represented by fragments of heads, arms, feet, or mere pieces of flesh. Individuals not connected with the magazines, nor on board the barges, however were killed or injured; amongst the killed being two men who were at the time about proceeding to their work in certain repairs to the river-wall at a place adjacent to the scene of the explosion. The destruction of property however was immense; though it is rather to be realized from the accounts, albeit inadequate, than discovered by a visit to any single spot. Where stood the buildings, there are now scarcely ruins, and the bricks of the magazines strew the ground as so many pieces cleaned of their mortar, better than could have been done by hand. A wide cavity in the earth shows where stood the principal building, a substantial structure, belonging to Messrs. John Hall & Son, of the Faversham Mills, and about 50 ft. square. It was erected five or six years ago, at a cost of about 3,000*l*. The other magazine, variously stated as about 60 or 70 yards distant, or as about 300 or 400 yards, belonged jointly to the Elterwater and the Lowood Gunpowder Companies, and measured about 40 ft. by 30 ft. Each building was in two floors, and had a wooden jetty for the unloading and loading of vessels. The other buildings were three cottages, occupied by the two storekeepers, one of whom is living, and by the workpeople, and were at some distance from the magazines. The barges were blown into fragments, which fell into the river, or, with some portions of the buildings and their furniture, and of human limbs, were projected to incredible distances. Some of the business-papers were carried into Woolwich Arsenal, distant four miles. This latter place was, by the inhabitants of Woolwich, at first thought to be that of the explosion. The embankment-wall, for about 300 ft. in length, was forced into the river; and the marshes of Erith and Plumstead, and parts of London itself, which the water covered before the period of authentic history, were laid open to the rising tide. The consequences of this portion of the calamity, to which we have alluded, have at present been averted, as we have said; but in their full extent, they are to be estimated only by professional readers, acquainted with the districts in and east of London, and their levels, with the formation of the banks of the Thames, and with the accounts of some previous breaches. Now, the public mind rests impressed chiefly with the recollection of the concussion, and with the facts including those of the injury done in the villages of Belvedere, Erith, and Plumstead, in the town of Woolwich, and in parts of the eastern and southern districts of the metropolis proper. Glass was broken, and window-frames were forced in; so that in Belvedere, distant about three-quarters of a mile from the magazines, and in the other places, houses have been rendered uninhabitable. Ceilings and chimney-pieces were broken, and walls were so shaken, that at least one house, and this one at a considerable distance, has since fallen. Even in London, in the Minories and Aldgate, plate-glass was broken; whilst at the Crystal Palace a door was burst open; and in Norwood, a house that was in erection has been greatly injured. Such effects as these last were experienced at distances of ten or twelve miles. Though three distinct shocks are reported to have been felt, the almost instantaneous spread of combustion from grain to grain of the powder, barrel to barrel, floor to floor, and building to building, is surprising, even with the knowledge of the properties of gunpowder, and the infinitesimal thread of a train, or leakage, that suffices to establish a connexion between one enveloped quantity and another. The occurrence will doubtless receive attention from men of science;

but we may note that one statement refers to the falling down of grains of powder apparently unconsumed.

It is now seriously discussed, whether the storage of large quantities of gunpowder in places distant but one mile, or even ten miles, from a populated district, should be permitted. Half-way between the site of the catastrophe, and that of the Southern Outfall of the sewerage, is another magazine, to which happily no matter in combustion gained access, though glass was broken. Tiles were blown from roofs of buildings further distant. Close adjoining the property of the Metropolitan Board of Works, is yet another magazine, which was empty, but to which the attention of the Board is, we believe, pointedly directed. Further west, or above Crossness Point, is still another magazine, this last belonging to Government.

The chimney and buildings of the Outfall-works, received no damage, beyond that of the fracture of plate-glass of the value of about 150*l*. But had the marshes been inundated, the Outfall-sewer itself, with its numerous ventilating-shafts, as well as side entrances,—and without considering the existing state of the several channels in connexion with the reservoir,—would have been flooded; and the sewage would have been dammed up, even as far as Battersea. The invert of the sewer at the outfall, is 28 ft. 6 in. below the high-water level; whilst the surface of the ground where the engine-house and other buildings stand, is itself 6 or 7 ft. below the level. A breach in the embankment, beyond the jurisdiction, or works, of the Metropolitan Board, is thus seen to be a serious matter of consideration. Fortunately, on this occasion, there was a body of workmen who were able to proceed at once to the scene of the disaster.

Every circumstance of time and tide, availability of competent direction, presence of men at the works of the Outfall, vicinity of a great and disciplined military force with tools and appliances, and even the soil at the spot, happened to be favourable; and a more serious disaster than has occurred within recollection, by a breach in an embankment of the Thames, was by the greatest exertions staved off, and at length was, as we have said, averted. The manner in which the whole business was conducted, merits record in these pages; and the instance may be instructively compared with the experience of previous accidents as related in various books, where the loss to landowners, and the injury to the navigation of the Thames, through the years' duration of breaches, and by the repeated failures of attempts to close them, is graphically related.

In our volume for 1855, under the title, "Some Memorials of Father Thames," we published a series of papers in which will be found much historic and other information concerning the river; and in 1861, in two of our numbers, we printed a communication from Mr. C. H. Smith, on "The Present and Past Boundary of the River Thames at London," which contains some matter having a particular connexion with the present subject. Later in 1861, appeared Mr. Samuel Smiles's "Lives of the Engineers," in which considerable attention is given to the early attempts in embanking and draining in England. The efforts made about the seventeenth century were greatly due to foreigners, more especially the Dutch. Holland furnished to us the chief engineer, Cornelius Vermuyden, (who was knighted,) much of the capital, and a large number of the workmen. Vermuyden's name is connected with the reparation of breaches in the Thames, as also is that of Captain Perry, who stopped the Dagenham Breach. Perry's name, like Vermuyden's, holds honourable place in Mr. Smiles's volumes. Much of the information about early attempts in embanking is derived from Sir William Dugdale's "History of Imbanking and Draining Fens and Marshes;" and Perry's operations at Dagenham were the subject of a book by himself to which we shall refer shortly. The matter which this latter book in particular contains is not simply interesting at the present time; it is highly instructive for the future.

Whatever decision may be arrived at as to the required distance between powder-magazines and dwellings, it is quite clear by the recent occurrence, that they should not be placed close behind sea or river walls, and below the level of the top thereof, on land that has been reclaimed, and is lower than the highest level of the tide or stream. To place them so, is simply to ensure at some day, the blowing in of the embankment to the river, and such danger as has been run at Belvedere. When we come to notice Perry's labours, we shall find his account of them suggestive now of several points that require attention, beyond the matter of the location of powder-magazines.

Even residents in London require to be reminded that the Thames, in its present course, is to be considered, as it has been called, an "artificial river," almost throughout the distance from Richmond to the sea. But a walk along the top of the embankment-wall, as below North Woolwich on the one side, and Plumstead on the other, must set any one of an engineering turn wondering about the time when, and the people by whom, a work altogether so stupendous as the embankment of the Thames and reclamation of "the marshes" was achieved. The earliest references to the embankments speak of breaches in them, and thus point to a still earlier period as of their formation. Sir William Dugdale thought that they were works of the Romans, the Britons being unequal to them, and the Saxons likewise. Sir Christopher Wren, as reported in the "Parentalia," also concluded that these embankments were Roman, the Saxons being too much busied with Continental wars. The late Mr. James Walker, in one of his reports to the Navigation and Port of London Committee, in 1841, spoke of them as works of the Britons under Roman superintendence. Mr. R. P. Cruden, in his "History of Gravesend and the Port of London," doubts whether the Romans had sufficient inducements to construct such works, asks why the earliest notice of them is not till later than the Norman Conquest, shows by allusion to Romney Marsh, that the Saxons were capable of the execution of embankments, but finally rejects the Saxons, as well as Gundulph. He quotes from Hasted's "History of Kent," a record of the foundation of an abbey at Westwood, about a mile and three-quarters westward of Erith Church,—the spot being represented as "at the edge of the marshes;" and a coincidence with a similar foundation and position in the case of the Abbey of Stratford, in Essex, suggests to him the probability that the embankment of the Thames was commenced about the time when these monastic establishments were founded, in the twelfth century; and he says, "these were not attempts to grapple with the difficulty of restricting the channel of the river, but a beginning at the foot of the uplands to make gradual approaches to the great line of embankment that was ultimately executed."

The earliest printed statutes relating to embankments, are of the early part of the thirteenth century, in the reign of Henry III.; but they refer to laws of a previous period. They tend to show that in the reign of Henry II., or between 1154 and 1189, embankment had become an object of public importance. According to Cruden, Lambarde in his Perambulation of Kent (edit. 1596) "says that the Annales of St. Augustine do report, that in the year 1279, the Abbot and Convent of Lyesnes (Losnes near Erith,) enclosed a great part of their marshes in Plumsted, and that within twelve years after, they *inned* the rest also to their great benefit, and this it may be contended, means, that between the years 1279 and 1291, the wall of Plumsted level that restricts the channel of the river, was completed." On this evidence says the same writer, it must be presumed that the embankments between London and Gravesend were commenced early in the twelfth century by easily executed approaches; were extended in the reign of Henry II., between 1154 and 1189; and were generally completed in the century following.

The appearance of the marshes between Crossness Point and Erith, certainly favours the correctness of this view, of the gradual reclamation. Old embankment lines may be seen or traced; although none of them, probably, would have been perfect, so as to have stemmed the tide, on Saturday last, had it not been kept out at the spot where the breach occurred. In the formation of the Outfall-sewer, several of these lines were cut through, and were found to have been originally well constructed, with proper clay-puddle in them. In several of the *levels*, as the divisions of the marshes are called, on the north side, the inland lines are not very conspicuous. The main or river-wall, and the sluices to let off land-water, or irrigate the marsh, of course have to be kept in repair. Lengths of the embankment, extending many miles, are under the control of one or other Commission, the members of which generally have not much practical acquaintance with engineering-work, but who keep some men employed patching,—though too few in number, of course, to cope with any great disaster. Some of these men were engaged on Saturday last, near the scene of the explosion, as already mentioned. The Commissioners of old time had power not only to distrain for rates, but to impress labourers to repair.

Until recent times, breaches in the embankment, on each side, were frequent. Mr. Smith, in our pages, gave a list, compiled from Dugdale, of fourteen of them, as well authenticated, commencing in 1295 in the time of Edward I., and ending with the breach at Dagenham, which occurred in 1707 in the reign of Queen Anne. There must however have been many others. One in particular, we find mentioned by Cruden, on the authority of Lambarde, as having occurred in 1527, when the river made an irruption at Plumstead and Erith, and so much land was submerged, that it was not all regained till after 1590, notwithstanding there was provision by statute that money should be raised to defray the charge. There are ponds, and an inland embankment, as indications of one breach, at a short distance east of the Outfall-works. Another inundation, not amongst the fourteen of the list, occurred on the north side. It flooded the whole level between Purfleet and Grays; and amongst the results was the formation of a shelf which, we believe, still obstructs the navigation. Breaches at Bermondsey were numerous.

The breaches were liable to occur when a north-easterly wind blew; and we may form some idea of what would have been the effect of the wind that has been blowing since Saturday last, had the gap at Belvedere not been closed, or had the new work not been of a substantial description.

In the time of Henry VIII., the marshes of Plumstead and Lesnes, now the Woolwich practising ground, were submerged by water coming from Erith Breach; and for a considerable time all measures to reclaim them were ineffectual. Combe Marshes, east of the palace at Greenwich, also were inundated. One Acontius, an Italian, reclaimed some portion of these; and Baptista Castilione another portion. We were not then very clever in engineering, and did not become much better up to Perry's time. The first Italian was rewarded with a grant of 400 acres of the land.

Mr. Smith's statement in the first portion of his communication, relative to the absence of record of any breach from the time of Henry VIII., to the date 1707, is not exactly borne out, even by his table. The Isle of Dogs was often overflowed; and perhaps it is owing to the desire to preserve the position of Deptford Dockyard, that the river has been kept by artificial means to the course round this low land. When the breach occurred at Limehouse in 1676, houses were swept away by the current which ran across. After a breach at West Thurrock, the water remained on the marshes during seven years; and the breach, and lake, are still marked on maps. The long bank forming the frontage to the Dagenham and Barking Levels, was particularly liable to be burst through; and, says Mr. Smiles, the whole valley of the Lea, and that part of Essex were frequently under water. This, however, we have seen sometimes in late years, without the occurrence of a breach. Vermuyden was employed in 1621, to stop a breach at Dagenham, having been invited to England for the purpose. He recovered a large area; but there seem to have been other breaches from time to time. Finally the great breach occurred in 1707, at the spot, still known as Dagenham Breach, which is exactly opposite the Southern Outfall of the London sewerage. It remained open for thirteen years, during which many efforts were made to close it. All these proved abortive, till Perry, at the end of eight years, undertook a contract, and in five years more succeeded. He had nearly failed, however, several times, and was involved in serious losses. His description of the breach, and of the measures which he took, given in an 8vo. volume of 132 pages, with a plan, is valuable as an engineering record, and is particularly important just now as showing what might have occurred at Belvedere, and what attention to the state of the embankments generally and sluices, still is needed. The volume is scarce; but we have a copy now before us. The title runs:—

"An Account of the Stopping of Dagenham Breach: With the Accidents that have attended the same from the first Undertaking. Containing also proper Rules for performing any the like Work: And Proposals for rendering the Ports of Dover and Dublin (which the author has been

employ'd to survey) commodious for Entertaining large Ships. To which is Prefix'd A Plan of the Levels which were over-flow'd by the Breach. By Capt. John Perry. London: Printed for Benj. Tooke at the Middle Temple Gate, in Fleet-street, and sold by J. Peele, at *Lock's-Head* in *Pater-Noster-Row*. MDCCXXI."

In describing the breach, as he found it, Perry says:—

"And first, As to the Nature and Extent of the Breach: It was occasion'd by the blowing up of a small Sluice or Trunk, made for the Drein of the Land-Waters in the Banks of the *Thames*: And might, if proper and immediate Help had been apply'd, have been easily stop'd with a small Charge; the Ditch, or Drein, of the Marsh Grounds, which led to such Sluice, being at the first blowing up of the Sluice, not above fourteen or sixteen foot broad, and might, in a Day or two Days time, have been easily stop'd, by the bringing on a small Dam in Form of a Semicircle, to the *Thames* Wall, if many Hands had been set to it, but through the Neglect thereof, the constant Force of the Water setting in and out of the Levels, soon made the Gap wider, and when it once came down to the Moor-logg, Gravel and Sand, which lies but a little way below the common Surface of the Levels, the Water then gull'd to such a depth, and took such Power, that there was no Remedy found for the mastery of it.

"It is now about Fourteen Years since the Breach happen'd, and it has in that length of Time worn and spread it self into several large Branches, like the natural Arms of a River, by the Force and Fall of the Water, returning from off the Marsh Ground upon every reflux of the Tide; the longest of which Arms is above a Mile and a half in Extent, and in some places is 4 or 5 hundred Foot in breadth, and from twenty to thirty or forty Foot depth. There is by Computation, about a hundred and twenty Acres of solid marsh Ground, wash'd into the THAMES, in manner above mention'd, the surface being compos'd of clayie Ground, the next Moorlogg, then about a Foot or fifteen Inches blue Clay, and afterwards Gravel, and a sort of Quick-sand, as it has been esteem'd by the Undertakers before me, but I have found no other than common Gravel and Sand."

Perry proceeds to explain how "this sullage," driven into the river, was deposited at the mouth of the breach, and above as well as below it, in the reaches of the Thames. He remarks that the deposit had been particularly detrimental to Erith Reach; and that even in Woolwich Reach, as he had been informed, the depth of water was lessened. All breaches, he observes, must be attended with a considerable flow of "sullage" into the river. After mentioning breaches that had occurred, before his time, including one in "the Levels of DAGGENHAM Beam, not three Years and a half since," and several near Daggenham since he had been concerned there, he says, he attributes all such breaches not to any damage from the tides washing down or running over the tops of the banks or wells, but to the "bad Workmanship, decay, or defect of the Sluices or Trunks which are made for the drein of the Levels," &c.; and he alludes to sluices made of wood as "a prevailing Custom in ENGLAND," and as generally insecure and unskilfully placed. He recommends, therefore, a law to oblige all sluices on the banks of the Thames to be made "with Stone Cemented with Tarras." The reasons why they have not been made so, he thinks, are, first that men in England are not very willing to depart from the way of their fathers; and secondly, the matter of foundations. He argues however that if the foundations were constructed after the manner of buildings in Holland, the sluices might be formed of stone, or a sort of brick, as in Holland and Flanders, and might endure thousands of years. Perry's advice does not seem to have been attended to: at least, we have observed that sluices or penstocks of wood, are still existent. The construction of these is sometimes of the most primitive character; and many of them are quite out of repair; or, in some cases, the wood is rotten.

The breach in 1707, beginning with the failure of a sluice that had been allowed to get out of repair, quickly extended from the gap of 14 ft. to 16 ft., and ultimately led to the obliteration of about 1,000 acres of land. But that was not all: about 120 acres were washed away, as above described by Perry; and the soil formed a bank about a mile in length, and reaching half-way across the river. Perry gives a somewhat humorous account of the means adopted before he became connected with the work, such as sinking old ships filled with chalk and stones; and he shows that such devices rather tended to produce scour underneath the vessels or stones, and the still further scooping out of the soil, and its deposition in the stream.

The great destruction of property, and probably of life, and the loss and delay which we have endeavoured to convey an idea of, would have ensued from the breach at Belvedere, but for the circumstances to which we have alluded, and the course immediately taken. When the explosion occurred, it was the most fortunate circumstance that the tide was low; but there were only about four hours wanting to the time of high-water. The explosion had forced the greater portion of the materials of the embankment, in the 300 ft. of length acted upon, into the river, only throwing up on the foreshore a low mound, not capable of affording any protection. In the 300 ft. gap which was formed, the space which had been occupied by the foundation or base of the embankment-wall was filled with broken and shapeless masses of earth or clay, which had formed part either of the consolidated mass of the wall, or of the site of the magazines. The few men who were engaged on another portion of the embankment, were, at the moment, the only hands available for work obviously necessary for the exclusion of the rising tide, but which to be finished, not in the most substantial way, in three or four hours' time, demanded the labour of many hundred men.

Amongst the residents of Erith, who were all roused by the explosion, was Mr. Lewis G. Moore, an engineer who has been connected with Mr. Furness, in the contrivance of some of the means of executing the work of the Thames Embankment of these present days. Led to the spot, he immediately saw and appreciated the impending calamity, and recognized the necessity of setting to work a much larger force than that of the few men who were at hand. He at once despatched his card, with a hurriedly written request, to the resident engineer of the Main-drainage works, or his representative, to bring immediately all the men, with barrows, picks, spades, and other requisite tools, that he could muster.

The explosion had startled every one at Plumstead. Mr. F. R. Houghton, one of the engineering staff of the Metropolitan Board, and representing Mr. Grant and Mr. Bazalgette, is resident there; and he was aroused, and was soon on his way. He was met by Mr. Moore's messenger. The men at the Outfall-works seem to have had the idea at once, that their services would be required; and they started, about 400 in number, on the moment that Mr. Houghton gave the order. To both Mr. Moore and Mr. Houghton the highest praise that we could give them would not be too much; and the first of these gentlemen has most deservedly received the thanks of a public meeting at Erith. Whilst Mr. Houghton, with Mr. Webster's navvies were on the way, and immediately upon their arrival, Mr. Moore directed the filling-in of the interstices of the lumps of earth, with puddle, rather as the best extemporized foundation, than as a sufficient substitute for a properly consolidated one. The work was punned in and rammed as well as time would permit; but it became evident almost immediately to Mr. Moore and Mr. Houghton, that the force under them would be insufficient. They then forwarded a communication to Major-general Warde, the commandant at Woolwich; and the result showed that "the system" must have undergone a change calculated to gratify the people of England; for, by half-past nine o'clock, detachments of sappers and artillery, to the number of about 1,500, were on the ground, with appliances of military engineering. They were under the immediate command of Colonel Hawkins, of the Engineers; but General Warde was also present. They were followed by the 5th Fusiliers and the Marines, some of the force being necessary to keep the ground; for, as the day advanced, great crowds were attracted from the surrounding places and from London. A considerable amount of work had been done before the troops arrived; but it was necessarily hurried, as it was essential to keep above the rising tide. The work contended with the tide, to use the words of those who were present, "inch by inch;" but it was kept always above the tide.

The troops brought with them a few thousand bags, such as, filled with sand, are used in the construction of sand-bag batteries; these were filled with clay, which was fortunately to be had by digging; and the bags were passed from hand to hand, and laid in the form of an arch on plan, to make the landward-side of the upper half of the embankment, puddle being filled in between them, and the whole being rammed down, now in a more complete manner than had been possible at first. At length, about two or three o'clock, the work was completed, having withstood the tide. In the night of Saturday, it sank, as had been expected, 6 or 8 ft., and water trickled through. The military and navvies were actively occupied, backing up and ramming the work, on Sunday, when the embankment was exposed to the waves washed by a heavy gale, and stood the test. Next day, we believe, it passed into the hands of the Dartford Commissioners, when a band of navvies were engaged, still further consolidating; and the work was reported as secure as the original wall. On Wednesday, however, there were still 200 navvies engaged; and it had been deemed prudent to fill up the hole in the foreshore, caused by the explosion of the barges, with chalk stone, of which 100 tons were thrown in. At one time, on the Saturday, the danger seemed so imminent, that Mr. Moore proposed, if he did not actually make arrangements for, the scuttling and sinking of a dozen barges loaded with clay, to form a breakwater in front of the breach; but this arrangement, if Perry's reasoning on his experience at Dagenham be correct, could have been only a forlorn hope; as there would have been scour under the bottoms of the barges; and, in two or three tides, a deep channel might have been scooped out.

The manner in which the military went to their work, elicited the admiration of all who saw it, including that of the navvies; and the civil engineers named, have expressed their warm acknowledgments. It is evident that without the force and dicipline of the great body of men brought upon the ground on Saturday, and again on Sunday, the previous labour (not bating a particle of the credit due for it) would have failed to cope with the difficulty.

How the matter of accounts with Mr. Webster, is to be settled, we have not heard; but there seems some doubt whether actions will lie against the proprietors of the magazines, by any of the parties who have suffered, or whether the insurance offices can be expected to treat the injuries to property insured only against fire as having resulted therefrom; though one or two offices are understood to be ready so to consider the injuries.

We have hinted that there is some reason to apprehend that the embankments of the Thames, which are said to make in the total 300 miles, are not as they should be for security. The danger averted,—and, as we have shown, through a most fortuitous conjuncture of circumstances,—will we hope incite the several Commissions, and the Conservators of the Thames, to consider whether better survey, and more frequent reparation of the embankments and sluices are desirable; and whether it would not be well to prevent such risk as is proved to be incurred by the storage of gunpowder in a position where explosion may cause a breach.

We are sorry we are unable to agree with some of our contemporaries respecting the arrangements of the Railway Company on Sunday. Giving all praise for the rapidity with which the military were despatched from Woolwich; the arrangements, with the single exception of the not despatching a train from a station before the line was clear, seem to have been made expressly to lead to accident. Tickets, down, were issued at the intermediate stations to crowds for whom there could be no room; and the journey was in consequence, a continual battle between those who had seats, and those who thought their tickets gave them a right. Instead of only one carriage being on fire, we know that there were several. On these occasions, the metropolitan police should be called in to assist the porters and railway-police. The force at Belvedere, on Sunday, however, was quite inadequate; and many of the men were withdrawn to London, before the chief need for their services was experienced. Disgraceful scenes at railway stations, on Sunday nights, are not unfrequent: they tend to accidents such as occurred at Belvedere and Plumstead stations on Sunday last; and they discourage respectable persons from travelling. There is some defect in the reporting arrangements of a section of the daily press; so that a report (the same appearing in several papers) is allowed to state what the writer saw, as being the whole of what took place.

WEDGWOOD INSTITUTE, BURSLEM.

CERAMIC ARCHITECTURE.

LAST week six tenders were sent in for the erection of the proposed Wedgwood Institute; and were of the following amounts:—4,293*l.*, 3,739*l.*, 3,671*l.*, 3,562*l.*, 3,497*l.*, and 3,360*l.* The lowest, which was that of Mr. T. B. Harley, of Burslem, was accepted.

Our readers may remember that the committee advertised for designs for the façade of the Institute in ceramic manufactures, and that Messrs. Edgar & Kippell, of London, obtained the first premium. The committee found that

the design of those gentlemen was impracticable on account of the expense. They were, therefore, desired to prepare another design for the decoration of the façade; and this has been done by Messrs. Edgar & Kippell, to the satisfaction of the committee and the judges.

We give a description of the proposed front in the designers' own words:—

"To fulfil certain requirements, we have been commissioned — after receiving the first-prize design in the late competition—to prepare a design for the ceramic decoration and external arrangement of the Wedgwood Institute. The task was one which imposed many difficulties on us; and these chiefly arose from the circumstance that the main condition on which we had to work was a strict adherence to the plan prepared for the internal arrangement of the building by its architect, Mr. Nichols. Whatever features of external effect we might have been disposed to introduce were bound to be subordinate to the fixed and approved design of Mr. Nichols, who must necessarily look at the building from a different point of view.

The most insuperable of these difficulties, as they occurred to us, was the omission of all windows or other openings in the first-floor wall of the building, the whole of the front apartments on that floor having to be lighted from the roof. As far, therefore, as the exterior of the building was concerned, we had a blank space of dead wall of formidable dimensions presented to us. It would be idle and uninteresting to recapitulate now the various methods we successively essayed for dealing with this portion of the façades. It is sufficient to say that we finally resolved on the treatment shown on the design now exhibited; and that our consulting referee — Mr. Beresford Hope — (who kindly undertook that office) approved of the exterior without qualification. What we propose is, to introduce into the blank space of this first-floor wall a series of terra-cotta panels representing the twelve months of the year by half-length female figures all variously designed and modelled in relief. These will be contained in a moulded framework of architectural character, and surmounted by a triangular pediment, the space inclosed by which will contain the sign of the zodiac corresponding to each month, and will be surrounded by brilliant-coloured mosaic.

The whole of this part of the design will be executed in red terra-cotta, of a colour and texture which will show out against the red-coloured brickwork with which the exterior of the building is to be faced.

A cornice in buff-coloured terra-cotta will surmount the story in which these panels are placed, and will be crowned by a rich ornamental cresting in the same coloured material, the roof above being coloured with a deep rusty green-coloured tile, such as we have ascertained can be secured in the immediate neighbourhood of the building.

Between the two stories a coloured frieze is to be introduced, 2 ft. 6 in. in depth, divided into eight compartments, which will represent so many of the industrial processes of the modern manufacture of pottery. It was originally intended by us that these subjects should be modelled and coloured in the manner of Della Robbia; but, as the expense of producing in this case would form a very serious item, and make a large inroad on the whole sum allotted to us for our design, we were very reluctantly compelled to abandon the idea of carrying out this feature in relief, and resort to painting the same subjects on the flat. It would be a matter of congratulation to us if we could hope that the introduction of the Della Robbia ware would ever be practicable at some subsequent time before the work is actually undertaken. When we consider, however, the secondary object for which the ceramic design is conceived, there is one argument which should probably reconcile us to these subjects being painted on the flat as compared with the modelled treatment. If the Wedgwood building is to serve as a pattern-card, so to speak, of the uses to which modern pottery can be put in architecture, and of the market prices at which it can be produced, it is no doubt desirable that all the ceramic work should be of a kind and be introduced in such a manner as will best answer to the modern notions of economy in building. In regard to this particular feature of our design, such a result will no doubt be best obtained by having this frieze of subjects manufactured in numbers of flat pieces, as tiles, rather than in large modelled and moulded slabs, which would necessarily be much more costly in the process of making and in the risk of firing.

The windows of the ground-floor are proposed to be decorated with buff-coloured terra-cotta, in various modelled designs, somewhat after the type of the windows in the great court of the hospital at Milan. The space contained within the arched window-head will be filled with red Mansfield stone, to serve as a framework or back-ground for richly-coloured portraits of the most celebrated potters of ancient and modern times. [The chairman intimated that this was a mistake, as it was proposed to introduce Brindley and other of Wedgwood's contemporaries, who were not potters at all.] These portraits will be painted in Majolica colours on large circular plaques, and the remainder of the space, or spandrel outside of them, will be in enamel mosaic.

The porch, or front entrance to the building, is designed to form a central object on the ground-floor. Varieties of ceramic material are employed in its principal parts. The shafts on each side of the door, which carry the archway over the entrance, will be fluted in buff terra-cotta, and the flutes filled in with rich mosaics. In the face of the porch, and over the archway, three small panels, in Wedgwood Jasper-ware, are introduced, and are surrounded by an enamel mosaic ground. The small panels will probably contain some heraldic subjects connected with the Wedgwood family and the town of Burslem.

In the more architectural features of our design, moulded and ornamental brickwork will be used, and the entire façade of the building, both in its constructive and decorative parts, will thus be almost entirely composed of ceramic material."

THE WINDOWS OF GLASGOW CATHEDRAL.

An enterprise of which we have taken notice at various times is now completed. On the 3rd of this month the last window of those under the charge of the committee was placed in its destined position.

The first window erected was formally inaugurated on the 19th of November, 1859: it was the great west window of the church, the artist being Mauritz Von Schwinde, and the donors Messrs. Baird. The last and forty-sixth window of the series now completed is a triplet, the subjects being from the life of Saul, king of Israel; the artist Strahüber. The donor is Sir Andrew Orr, chairman of the committee.

The first painted window erected in Glasgow Cathedral arrived from Dresden in April, 1857, and was placed in the crypt: since that time, seven years and five months ago, eighty-one windows have been erected in various parts of this cathedral, viz., forty-six in the nave, choir, and lady chapel, under the direction of a committee of donors, upon a plan of Scripture illustration agreed upon, and a scheme of harmonious design and colour arranged for the entire series, all from Munich; four in the chapter-house, from London; fifteen in the great crypt,—that under the choir,—being two from London, two from Edinburgh, three from Milan, four from Dresden, three from Brussels, and one from Munich. In Blackadder's crypt, one from Brussels, three from London. In Lander's crypt, twelve from London. Ten windows are still in the course of execution, and two others are allocated.

This seems pretty well in a country where, only a few years ago, ecclesiastical or church decoration was not merely unthought of, but was disliked.

On the 23rd of February, 1856, a letter (from Mr. Heath Wilson) to the Lord Provost of Glasgow was published, which contained the following proposals:—

"I might quote other examples from the great periods of art, as well as from modern works, of adherence to a general plan in the decoration of ecclesiastical and other public edifices: it is obviously desirable that a similar plan should be adopted in our cathedral. The number of windows is so great that a magnificent series, commencing with subjects taken from Genesis, and ending with the Ascension, might be represented in succession."

In the same letter the importance of making these windows *works of fine art* was urged. By the harmonious action of the donors these ideas have been realized. The windows contain Bible subjects chronologically arranged, from the expulsion of our first parents from Paradise, in the first window, to the resurrection of our Lord, in the last. They are certainly works of art—some very poor, but not a few of them of very fine design, however opinions may differ as to the *principles* upon which they have been designed and executed.

A SYSTEM OF HANDRAILING.*

The first person who printed any directions concerning the mode of forming a wreath rail, was Mr. Francis Price, surveyor to the cathedral church of Salisbury. In the first half of the last century he published a work entitled, "The British Carpenter," in which the wreath rail was mentioned. This work was dedicated to the Earl of Hertford, and the titlepage bore the following certificate:—"Having perused this treatise of carpentry, compiled by Mr. Francis Price, we think it a very useful and instructive piece, and as such recommend it to every one concerned in works of that kind.—N. Hawksmoor, John James, James Gibbs." Notwithstanding the approval of these celebrities, Mr. Price's work was superseded in the public esteem by that of Mr. Peter Nicholson, who, in "The Carpenter's New Guide," laid down a plan by which wreathed handrails round circular and elliptic well-holes could be squared upon geometrical principles. Hitherto the method of forming a rail was that of tracing it like an angle bracket, from the rise and tread of as many steps as the rail was supposed to occupy in winders, and making the face mould of a parallel breadth, after obtaining the middle of the concave side; and this was always found to give a false result according as the difference in the circumference of the arc at the plan was greater than its chord. In 1822, Mr. Nicholson, with additional experience and research, condensed the whole art of handrailing into the necessity of finding the section of a cylinder to pass through three given points on its surface. With much elaborate labour he described the various processes required in the projection and construction of handrails according to his views; but to these we need not refer, as, in turn, Mr. Nicholson has been superseded by a new teacher. Mr. Joshua Jeays, in applying the rules laid down by this writer to practice, found the face-moulds given by them incorrect, the lines given as the butt-joint lines of the face-moulds being entirely out of their proper place. This led him to consider the subject; and having arrived at a new method, he communicated it to the Society of Arts, and afterwards laid it before the public.

Mr. Jeays urges that the construction of the handrail upon the principles of the orthogonal system is more economical than those previously practised; and that the face-mould is more easily applied to the plank by this method than by any other. He contends that it is also a more simple mode, and mentions as an example of this fact that the problem for determining the direction of the ordinates in the construction of the face-moulds is solved with four lines, which number is less than one-third of that employed by Nicholson for the same purpose. The construction of the butt-joint lines of the handrail upon strict geometrical principles, and the determination of the scroll from the logarithmical spiral, are among the additional new details in the volume now under notice, for which the practical man will thank Mr. Jeays.

Stairs are an undeniable growth of civilization. Contrasting the high houses of Belgravia and Paris, or the tall gable-ended homes of the honest burghers of the Middle Ages, with the stairless huts of primitive races, or the one-storied cottages of the agricultural districts, we might infer that, the more stairs, the higher the culture of those for whom the houses containing them were built. But we are so used to these accommodations that we scarcely heed them. Of the thousands of persons using them a score of times a day, there is but a small proportion that give a thought to the principle upon which they are formed, or are even aware that the construction of a staircase is a geometrical question. But to this small proportion the art of forming a staircase, with its handrail, is an affair of great moment and interest. The smartest joiner considers the projection and formation of a handrail the test of his capacities; and the town or country joiner completing his apprenticeship reserves the mastering of the difficulties of this art as the finishing strokes of his proficiency. There are, probably, few experienced joiners but can call to mind the evenings they spent, after their day's work was over, in pondering over the various problems required to be worked out before they became adepts.

The first process in the construction of a stair-

* "The Orthogonal System of Handrailing, with Practical Illustrations of the Construction of Stairs." By Joshua Jeays, author of "The Geometrical Construction of a Hip-roof." Second edition. London: Simpkin, Marshall, & Co. 1864.

case is to determine the proportion of the steps, for these vary in breadth from 8 in. to 16 in., and in height from 4 in. to 8 in. or 9 in., and there is a limit to the variations in these proportions, which cannot be exceeded without an unsatisfactory result. Mr. Jeays does not lay claim to novelty in his general theorem for determining the height or breadth of a step. "Let R represent the riser, and T the tread of a step, the proportions of which have been determined, and r and t the riser and tread of a required step. By having the two values R and T, we are enabled to find a fourth, proportional to another given value, r or t. That is, if we have the height, r, of the riser given, we are enabled to find the breadth, t, of the tread; or if we have the breadth, t, of the tread given, we are enabled to find the height, r, of the riser, by the following proportions:—

$$r : R :: T : t;$$
$$t : T :: R : r.$$

The value of the fourth or last quantity is found by multiplying the second and third quantities together, and dividing their product by the first, as expressed in the following formulæ:—

$$\frac{R\,T}{r} \ldots (1) \text{ or } \frac{T\,R}{t} \ldots (2),$$

accordingly as the riser or tread of the required step is given." The next process is that of dividing the story-rod. Then follows the planning. For the simple dog-legged stairs the rectangular parallelogram is the form generally chosen; but departures from this kind of stair call for especial plans. In olden times the turret stair or steps winding round a newel was the general form, as may be perceived in the various remains of the architecture of the Middle Ages. It was not until the castellated residences of the nobles of the land were superseded by the mansions built in Tudor times, that the staircase began to be treated as a consequential feature in dwelling-houses. At this date the steps were made parallel with one another: the flights were made wider: landings or resting-places were used: the walls were panelled; and the parapets formed of carved balusters or open fretwork. This new fashion was eventually carried to extremes, and staircases may be seen in some houses of a spaciousness not warranted by the size and number of the rooms. The circular well-staircase was a later fashion, and the oval well a variety of the same form. A staircase that is very effective and simple, consisting of a wide flight of steps, with two narrower flights branching off right and left from the landing-place, is a still greater favourite. All these varieties call for the handrail; and, as modernised, for the wreath.

Mr. Jeays commences his instructions concerning the formation of the wreath by the consideration of problems necessary to complete the theory of the orthogonal system. After explaining his method of projecting a simple curve upon an oblique plane, he proceeds to carry out the same principles in the construction of the common face-mould, and shows how the plan of the butt-joint line may be found. Directions concerning the best modes of squaring the wreath, of constructing the falling mould, and the scroll, follow. After directing the student's attention to details upon the construction of the moulds of a wreath for a quarter-space, and for a half space, and for a wreath over winders and other knotty points, Mr. Jeays proceeds to consider the application of the common face-mould to the plank, and to the orthogonal solid. The art of joining the wreath upon the bench is another difficult process, simplified by Mr. Jeays; and he also goes into the question of veneered handrails. The core of the wreath got out by the orthogonal system, the veneer is cut into shreds about 3-16ths of an inch broad, with a cutting gauge, and glued, five or six at a time, upon it. Steam should be brought to play upon them by a nozzle attached to a pipe, with a universal joint. Altogether the treatise is as comprehensive as the joiner could desire, as far as directions for the execution of work are concerned. If the various descriptions of staircases had been pointed out little more could have been desired.

New Park at Llanelly.—The opening of a new park has been celebrated at Llanelly by a public demonstration, a procession forming in front of the town-hall. The occasion was also made available for laying the foundation-stone of a new market, about 3 acres in extent, on Col. Stepney's park.

THE FRESCOES IN THE HOUSES OF PARLIAMENT.

At the recent meeting of the British Association for Science, Mr. W. Poole King, of Bristol, read a paper in the chemical section, on "The premature Decay of the Frescoes in the Houses of Parliament: its Cause and Remedy." He said: "Having lived for many years upon the Durdham Down limestone, and for a long course of time made observations on the walls built with mortar from this stone, which I understand has been brought from Bristol, and used for the plaster on which the national frescoes have been painted by special recommendation from authority, and having frequently examined those walls, both in and out of doors, I immediately recognised, from the description given by Mr. B. Atkinson, in a paper published in the journal of the Society of Arts, that exactly similar effects were taking place on the walls of the Houses of Parliament to those which I had been accustomed to see in constant operation. All the beds of Durdham Down limestone are of marine origin, being full of marine shells; and, although, in the long lapse of ages since they were deposited, the marine salt with which the stone must have been saturated has, for the most part, been washed out, yet still a trace of it remains insensible to an ordinary analysis. It is the general practice to burn this stone into lime with braize, (or cinder taken from the scavenger's yard,) and this braize always contains sulphur. In this chemical section, I need hardly say that in thus burning the minute quantity of marine salt in the stone is converted, for the most part, into sulphate of soda, or the salt well known in commerce as "Glauber salt." On most of the walls that grow cold in winter, I have found needle-form crystals, varying from a bloom 1-100th of an inch to needles of an inch in length, and in some instances in damp old walls, such as the cloister walls of a cathedral, the crystals stand out to the length of 1½ inch. At first I examined these crystals chemically. They were generally composed of sulphate of soda, in rare instances found mixed with nitrate of potash, and sometimes with small quantities of muriate of lime and magnesia. I soon became familiar with these bunches of needle-form crystals, and from their taste and general appearance, could not mistake them. When the weather becomes dry, all these bunches of crystal efflorescence are converted into a loose white powder, much of which drops from the wall, carrying with it shales of plaster, or flakes of paint, or films of whatever material the surface of the wall is covered with. Moisture will condense on the wall, if allowed to grow cold, in damp weather: the white powder is then dissolved, and the liquor, a solution of sulphate of soda, is absorbed by the mortar or plaster. Architects are in the habit of proving the value of the various kinds of stone presented for their use, for the endurance of frost, by a saturated solution of sulphate of soda, similar to this liquor, which, on crystallising, imitates the heaving and splitting action of ice forming from water. Accordingly, this liquor is no sooner absorbed as the wall dries, than it aggregates into ice-like crystals, and the plaster is disintegrated and heaved by the dynamical force developed in their formation. The plaster having sustained this injury, the salt transforms itself, and shoots out into bunches of needle-formed crystals, only to fall again into the terrible white powder, as the air becomes warm and dry. Thus a constant succession goes on of solution and desiccation, with the changes of the weather and temperature; and if the wall be permitted to cool with the frost, the ruin of the plaster is insured. Sulphate of soda exists, not only in Durdham Down limestone, but unfortunately also in much abundance in all the lias mortars, in London clays, and in many other stones. In fact, I doubt if any London wall is entirely free from its presence. We may, therefore, observe this kind of action of destruction going on more or less almost everywhere. A marked instance of its injurious effect can be seen in the Crystal Palace, where not only the surface of the richly-decorated walls is attacked, but also the plaster-cast statuary suffers, and requires constant renovation. In Rome and Florence, indeed, many frescoes have remained entire, with their colours smooth and in good order, for hundreds of years; but then these frescoes are on plaster made from travertino,—a limestone of fresh-water formation, free from salt, and the lime has been burnt with wood charcoal, in which there is no sulphur. In a late view which I had of the admirable fresco which Mr. Herbert has just finished, I find that the robing-room in the House of Lords was kept with a wet floor. If this apartment be ever allowed to grow cold, can we doubt that the fate of this glorious work of art is sealed? Damp will condense in drops on its surface, and be absorbed. These drops will dissolve whatever trace of sulphate of soda exists in the plaster, or, perhaps, in the mortar of the wall. The salt will aggregate together (probably by the force of dialysis), then form ice-like crystals, to heave the plaster, and show itself in a bloom on the surface of the fresco, and then desiccate into a dry powder, to be re-dissolved by the first moisture which comes over it, and then be re-absorbed again, till at last it aggregate into blotches, and the destruction be complete. To preserve this fresco, I should recommend that the robing-room be kept always warm, and as dry as possible, so that the sulphate of soda may not pass into solution and aggregation; and surely such a work of art, of which the nation is so justly proud, is worth the cost of any expense incurred in its preservation. The "liquid glass process," I understand, has been tried to secure the preservation of Mr. Herbert's fresco; but I doubt its power to prevent the plaster absorbing any drops of moisture which may come on its surface. Indeed, if there be any soda in the preparation of liquid glass, it may accelerate the work of destruction; for carbonate of soda is almost as efflorescent a salt as sulphate of soda, into which, however, the former is often converted by the sulphurous acid gas seldom absent from London air. I conclude that fresco-painting on fresh-water limestone walls, kept constantly warm and dry, will have the best chance of endurance for ages yet to come, for the delight of our remote successors."

SOCIAL SCIENCE IN YORK.

One of the most important papers brought before the Social Science Association at the York Congress was the address of the president of the fourth department (Mr. Edwin Chadwick, C.B.) on social questions generally. It was cheering and encouraging, as well as instructive, and might be usefully circulated in a cheap form. In the course of an account of our gigantic system of cotton manufacture, he said, as illustrative of the progress of this manufacturing system, and with it the progressive reduction of manufacturers' profits, on the piece, he had been told that there were persons recently living who saw a stockingless boy carrying milk in the town of Bury—saw that boy become a cotton printer by hand—then a great manufacturer by machinery—then a member of Parliament, and a baronet with a princely fortune—the father of a Prime Minister, and the founder of a house of statesmen. On a late visit to Manchester he was shown some cotton cloths, printed with dyes brought from India, of a pattern and sort printed by the first Sir Robert Peel, that were to be sent out and sold in India—cloth, printwork, and all—at about half the price which Peel had charged for printing alone. The progress of our cotton production may be represented by the fact that the cost of the pound of No. 40 yarn cotton included was, in 1812, 2s. 6d.; in 1830, 1s. 2½d.; and in 1858, 11d. Great manufacturing improvement, he said, has been due mainly to successive periods of manufacturing distress. It was an axiom of the late Mr. John Kennedy, father of the cotton manufacture, that no manufacturing improvements were ever made except on "threadbare profits." When the trade is doing well, the axiom is, that they cannot be better than well, and they remain as they are. But when the market is overstocked, or when from any other cause there is no sale at the then prices, the manufacturer, whose machinery is unemployed, and large capital wasting, is driven to his wit's end to exercise invention, and listens greedily to any by which production may be cheapened, prices lowered, and consumption stimulated. Stocks of goods being unsold and kept in hand, the manufacturer does not like to go about with "sacrifices," or throw them upon the depressed market at home. He has a young fellow, a son, or some one else whom he trusts, and he sends him with a shipload of goods on a venture like a travelling packman—on a venture to most remote parts of the world, to get any produce in return for them—ivory, skins, anything. The purchaser, who has got these adornments at low prices, has a strong motive to get them on the backs of the natives, and once on them, there is admiration and a permanent de

mand for them, as there is now, not only in the remote parts of India, but in China, Egypt, Asia Minor, Greece, Turkey, Persia, Mexico, and the Brazils. By such successive pressures of distress, the production has been raised in 1860 to 76 millions, or six millions more than the gross revenue of the United Kingdom, of which the declared value of the exports was 52 millions. The wholesale dealers put 10 per cent. generally on the price of the manufactured article, and the retail dealers generally add to that 20 or 25 per cent., or, on the whole, some seven millions to the 24 millions paid for the cotton produce consumed at home.

At the close of his address, after describing the unsatisfactory and unwise conditions under which the majority of workmen labour, Mr. Chadwick thus suggestively perorated:—As it would be with soldiers in a garrison, the aggregation of people in factories, without due provisions outside the factory, is productive of irregular and inferior service, and frequent unintelligent action within the factory. As, however, manufactures on a larger scale have become more settled and systematised, and the consumption of goods more regular, and as capital has accumulated, many better educated and more liberal capitalists, with leisure to look beyond the walls of their manufactories, have introduced various improvements in the condition of their workpeople; some by providing better houses for them, others by providing improved schools for their children; and they have generally found that the improved external conditions, by bringing and keeping a more respectable class of people about them, have been attended by improved internal service in the manufactory. Sanitary science and economical science will now enable them to invite new comers by saying to them, "If you join us, you may rely upon having fellow-workers of respectable conditions, and of being protected from the annoyance of association with habitual drunkards, or with persons of disreputable conduct; for we permit none such to remain with us. Our place of work is warmed and ventilated on the best principle, and provision is made for the personal cleanliness and comfort of our workpeople. You will have a convenient self-contained house for your wife and family, well drained and ventilated, and provided with pure water, as also with warm water laid on from the condensing water of our works for baths and for washing, with a garden plot attached to it. Our workpeople have a co-operative store of their own, in which you may obtain wholesome food at wholesale prices, by which you may save 20 per cent. on your expenditure for food. Your children will have the advantage of a school under good teachers for physical as well as mental training on the half school-time principle. We have engaged, for the protection of the health and working strength of our people, the services of a medical officer of health, less to cure than to prevent disease by seeing to the removal of its causes. If you attend to his suggestions, for yourself and family, whilst using our working and living rooms, you may reduce your sickness and insurance charges more than one-half, and extend the period of your working ability more than ten years beyond the periods obtained in other places. This will enable you, under Mr. Gladstone's Annuity Act, by increased savings, to obtain a deferred annuity, that will give you easy and respectable independence when you are past work. In the ordinary conditions elsewhere, your doom, a premature death, after a wretched life, is certain. In the common conditions, in ill-drained, ill-conditioned, cesspool-tainted houses, without proper supplies of water, for which you will have to pay higher rents in low neighbourhoods, half your children will be in their graves soon after their fifth year, as you may see by the registrar's returns all workmen's children are in Manchester, in Glasgow, and elsewhere. But here your wife may rear them all, and educate and train them all well, and you may enjoy with her and them the comforts of a cheerful home, to which comforts each child as it grows up may, by duly moderated and salutary labour, contribute." If the million and a half of money lent by Parliament for the employment of the unemployed cotton operatives should be wisely expended in putting the habitations of the workers in a proper sanitary condition; and if the experience of the results of proper works should lead to their general application to all places in the manufacturing districts, where such works are needed; if the habitations be put in a condition as homes befitting a better trained and educated population; and if the better training of the incomers be provided by the due application of half-time education; then this late and large distress will, like others, be attended by adequate compensation. If the principles of economical and social science which I have indicated in their relation with the means of intellectual, moral, and physical improvement, be duly regarded and applied, the conditions of the manufacturing population, instead of being deplorable, will be brought up to advanced moral and social and intellectual conditions, commensurate with the increased and increasing wages derivable from the extraordinary improvements in the mechanical arts of which they are the ministers and the servants.

THE METROPOLITAN BOARD OF WORKS AND THEIR CONTRACTS.

We have at various times received a number of letters respecting the acceptance of Mr. Furness's tender for the first section of the Embankment instead of that of Mr. Ridley; the asserted connexion between Mr. Furness and the engineer of the Board; and the more recent use by Mr. Furness of dry rubbish from land, for permission to shoot which a contractor pays him, instead of Thames gravel and sand, as stipulated, for which he would have to pay,—a change calculated to put into his pocket, it is asserted, about 80,000*l*. The sum and substance of the majority of these communications was an attack on the engineer as the cause of Mr. Furness having the contract instead of Mr. Ridley; and the Board having distinctly stated that it was not on account of anything said by the engineer that Mr. Ridley's tender was not accepted, we have persistently refused insertion to them, and have been duly abused in consequence. A fresh correspondent, however, now writes more irately than the others concerning the formation of the Embankment: out of doors a suspicious feeling exists; and members of the late Parliamentary committee on sewage are making publicly such injurious assertions with reference to the contracts, that we are disposed to think the Board of Works would do well by putting forth at once a clear and precise statement, setting themselves and their engineer right with the public, as doubtless they could do.

On one point let us add a sentence. If, as the engineer considers, the rubbish and earth obtainable from land, not merely without cost, but at a money gain, is equally good for the formation of the embankment, there can be no occasion to pay for Thames ballast. There is, of course, a clause in the contract which would admit of the substitution, and save the money to the ratepayers.

METROPOLITAN BOARD OF WORKS.

At the last weekly meeting of the Board, Mr. Miller, M.P., referring to the correspondence which had taken place about the filling in of the Thames Embankment, said it appeared from that correspondence that the contractors had engaged to pay a certain price for dredged material to fill in with, whereas they had been paid money to allow of brick ballast being cast on the Embankment; and he asked the engineer whether the Board had any claim upon the contractors for the difference in cost. He also wanted to know whether the contractors had the authority of the engineer to use the land ballast, and whether he approved that material. The engineer (Mr. Bazalgette) said the first question of the hon. member could only be answered according to the interpretation put on the language of the Act, and it would be satisfactory to him if the Board would consider what construction could be put upon it. He thought the contractors had been justified in using the land ballast as they had; otherwise the work would have been much delayed, as dredged material could not at first be obtained in sufficient quantities. The land ballast was excellent for the purpose for which it was used. None of that material, however, would now be used, unless that supplied by the Thames Conservators failed in quantity or quality. Mr. Newton was of opinion that, if no other material but that dredged from the Embankment were used, the consequence would be an inferior embankment, as that material had no "binding" quality in it, and was of a sloppy nature. It was agreed that the whole subject should be referred to the Thames Embankment Committee, to be considered and reported upon.

ARCHITECTURE IN PARIS SCHOOL OF ART.

The exhibition of the works of the pupils of the Paris School of Art competing for the grand prize of Rome has just taken place, with the remarkable exception of paintings. The omission of the last arose out of an accident, under the new system. The subject given to the architectural pupils was, "An Hospice on the Alps," and the results are a number of most elaborate drawings. M. Guadet obtained the prize, but no exhibition ever illustrated more fully the objection made by M. Viollet-le-Duc and other reformers to competitions in which the pupils are fixed to a given subject, and that subject a fantasy. The exhibition adds another blow to the existing mode of education which fixes all the conditions beforehand, and ties intuitive genius or talent hand and foot.

SCHOOLS OF ART: THE SOCIETY OF WOOD CARVERS.

We are glad to observe in the last report of the Society of Wood Carvers a considerable improvement in the position of the society. The present number of members is 164, twenty-two having been elected during the year. The report says,—

"The principal order for wood carving during the past year has been for the Baron Rothschild's mansion in Piccadilly, the carving for which has employed on an average twenty carvers for the last six months, and is still in progress at the works of Messrs. Myers & Son, the work being designed and modelled by M. Joyau."

It refers with great satisfaction to the prizes given last year by the architectural Museum and those offered by the Society of Arts. The following passage calls for comment:—

"The members of the School of Art, attached to the Society of Wood Carvers, do not show any increase in numbers during the past year, which is traced to many unavoidable causes. Mr. Vaughan, to whom the thanks of all members are due for the warm interest he has taken in the society's welfare, it will be remembered presented to the society the sum of 10*l*. 10*s*., that being half the amount of fees for twenty-eight members at the school of art for twelve months; but as the members attending did not reach half the number required, the society, according to previous arrangement, returned to Mr. Vaughan 5*l*. 5*s*., which amount that gentleman kindly presented to the funds of the society."

The fact that wood-carvers do not take advantage of the Marylebone Art School, thus made cheaply accessible, is much to be regretted. Never more than a dozen went, and only half that number went regularly, though two of them took the highest honours. The chief reason assigned in the shops privately is the dislike of the men to mix with the juvenile students, with whom the schools abound, and whom, in the preliminary course of outline, the men generally find to be their equals. Some mode of obviating this objection might be hit on.

SCHOOLS OF ART.

The annual report of the Reading School says,—"The number of pupils who have attended the school during the year has been 24 in the morning class, and 40 in the evening; total, 64. The master has been aided in his work by one local scholar, partly paid by the Department. His duties are to assist the master in the evening classes, and to teach in schools for the poor, five of which he has attended in Reading, and one at Henley: the total number of children taught by him has been 661. The knowledge of drawing and geometry gained by the children in this way is very considerable, and cannot fail to be of the greatest advantage to them, particularly to those who may become carpenters, stonemasons, engineers, or, in fact, be engaged in any industrial occupation, as it will not only enable them to make drawings themselves, but likewise to understand and work from a drawing or a plan when it is placed before them. At the examination held here and at Henley, on the 30th of last May, about 220 pupils were examined, of whom 163 were successful, some passing in two and three, and one in four and one in five subjects. 76 first grade prizes, and 14 second grade prizes have been awarded, and the remainder who were successful have received cards of merit. Contrary to most Government Schools of Art, we are not aided by subscriptions: beyond the aid received from the Department, the school is self-supporting; but the committee would suggest that a local effort be made to encourage the school, by offering prizes in the advanced stages of instruction."

Fig. 14.—*St. John's, Winchester.*

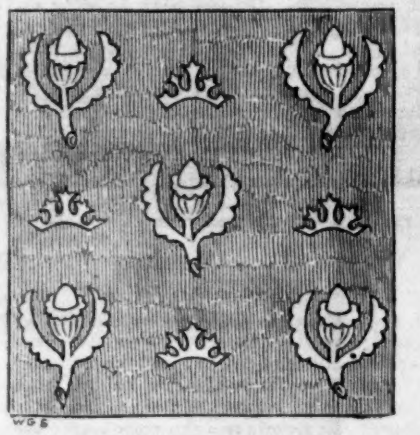


Fig. 15.—*St. John's, Winchester.*

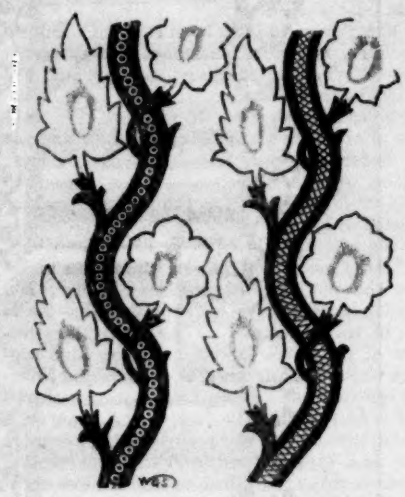


Fig. 16.—*Fifteenth Century Wall Diaper, Beckley, Oxon.*

Fig. 17.—*Headington: Tudor Painting between Windows, South Side.*

Fig. 18.—*Kelvedon, Essex: over Backs of Seats.*

Fig. 19.—*Chancel Arch, Little Barford, Oxon: referred to in the first article.*

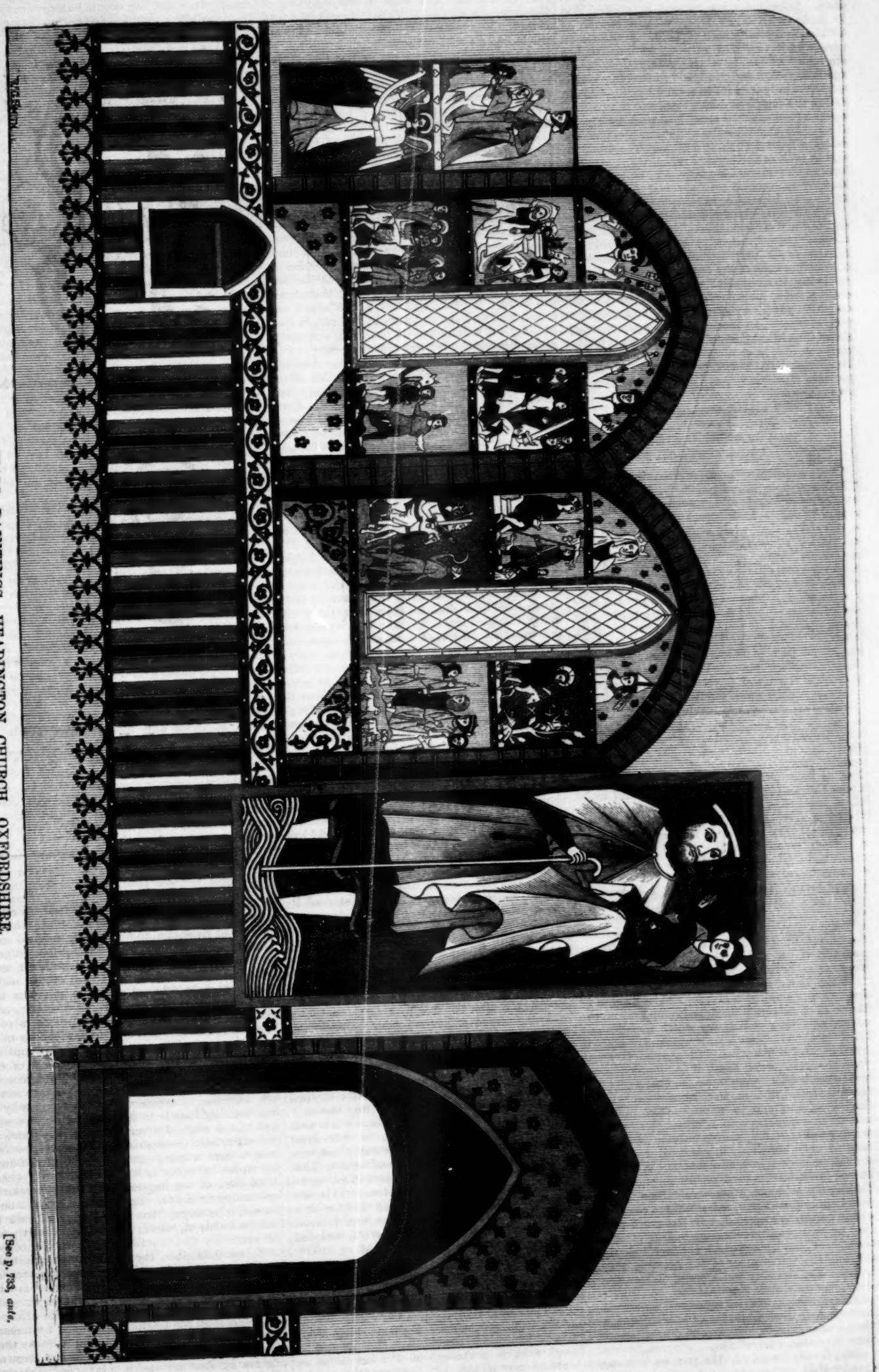
THE COLOURED DECORATION OF CHURCHES.

THE SO-CALLED "CRYSTALLIZATION" OF WROUGHT-IRON.

Few questions have been more discussed than the "crystallization" of iron,—the term being used to express the deterioration of the metal under more or less accurately defined circumstances. The greater number of the talkers and writers on the subject seem to have forgotten that iron is a crystallized body from its very nature, so that the first bar which issued from Tubal Cain's forge was just as much crystallized as the iron being manufactured at this very moment. On the other hand, it is impossible to doubt that some change is produced in the internal structure of iron, as the same bar which, when new, is found to stand sudden pulls or deflections without rupture, often gives way—showing but little, if any, external change—under loads of much smaller amount. High degrees of heat, and certain magnetic and electric conditions, undoubtedly produce an internal effect on iron; but such conditions are rarely, if ever, present in ordinary practice, so that it cannot be to such causes we must ascribe the sudden ruptures of railway and carriage axles, of chain cables, and similar objects. In an interesting article in the last number of our contemporary, the *Engineer*, on "Internal Changes in Wrought-iron when Cold," it is observed that:—"To cite the different instances of sudden and apparently unaccountable fractures that have been brought forward, would be to give a catalogue of almost every important application of wrought-iron. The sudden breakages of railway axles and rails are the most public instances. Chains, in the form of chain cables for ships, and as used for cranes, inclines, mining shafts, forge slings, and even for suspension bridges and similar purposes, in which they have to undergo impulsive forces, are peculiarly subject to a deterioration, due to whatever cause, resulting in fracture. The gags of helve hammers, and the porter-bars temporarily welded under the hammer to the blooms, are also remarkably subject to sudden fracture. Amongst minor and domestic instances may be mentioned the wires of pianofortes, and the spindles of watch escapements, which often break in an unaccountable manner."

If it could be shown that iron becomes brittle by mechanical means, such as undue strains, this would account for its giving way suddenly under impulsive forces; and the fact of the suddenness of the fracture would, as has been shown by Mr. Kirkaldy and other experimenters, account, *per se*, for the crystalline fracture. This is clear on reflecting on, 1, the nature of an impulsive force, and on, 2, the nature of the latent resistance to any extraneous force of an object with a brittle structure. A bar of glass would break suddenly even under a gradual strain, and the same would take place with a piece of brittle iron.

Our contemporary goes on to observe that:—"As soon as a bar of iron is strained in excess of the elastic limit, a certain amount of elasticity (or the power of temporary elongation) and of ductility (or the power of permanently elongating), are taken out of it. The amount of latent work it contained at the beginning is therefore diminished. If the experiment be carried still further, and the bar be broken three or four times, the bar at the last time of breakage will be found not to elongate at all, but its powers of resistance to a statically applied load are wonderfully increased. Taking longitudinal tension, merely, into consideration—as it may be called the representative strain of the major portion of most other strains—we see that the bar is elongated in a longitudinal direction, and that this elongation is accompanied by a contraction of its cross-sectional area, which actually brings the particles nearer together, probably causing them to very closely interlace each other. The hardness, therefore, of our bar, and, consequently, its powers of resistance to a static load, are immensely increased, but all its elasticity and ductility have been taken out of it. We will now cite a number of experiments in support of our explanation,—experiments, however, which, from a more or less forgetfulness of mechanical principles, have, one and all, been actually cited in support of the supposition that a breaking load increases the 'strength' of the iron. In one sense the 'strength' was increased; but it was a hard or brittle strength: the tough strength, or the elasticity and ductility was, on the other hand, annihilated. The most remarkable and important of these experiments were those made some years ago at Woolwich, by Thomas Loyd, Esq., the Admiralty Inspector of Machinery, and they are given at length in Dr. Fairbairn's 'Useful Information for Engineers.' Out of a number of other results of the same kind, we will take the successive effects produced on a 1¼ in. S. C. crown iron bar by four successive breakages. Twenty pieces of this iron, each 10 ft. long, were cut out of the middle of twenty rods of iron. These



WALL PAINTINGS, HEADINGTON CHURCH, OXFORDSHIRE.

[See p. 733, *ante*.

10-ft. lengths were cut into two parts of 5 ft. each. Taking that one marked F, we find that it broke with 32·25 tons, with a stretch of 10·5 in. in a total length of 54 in. At the second breakage it ruptured with 35·50 tons, with a stretch of 1·12 in. in 36 in. At the third breakage it ruptured under a load of 37·25 in., with a stretch of only 0·62 in. in a total length of 24 in.; and at the fourth and last breakage it gave way under a load of 38·40 tons, but with no stretch at all. By this time the section of the bar was reduced from 1·39 in. to 1·18 in. The constriction of area at the point of rupture is not noticed, but the rise of breaking strength, under a static load, *of from* 32·25 *tons per* 1·37 *in. section to* 38·40 *per* 1·18 *section, is remarkable.*"

Here is certainly a sufficiently simple explanation of the "crystallization," or, more properly speaking, the deterioration of wrought iron:—A brittleness gradually induced by a succession of strains in excess of the limits of elasticity, and rendering the material unable to withstand a sudden force, while this very brittleness would make the bar give way suddenly, and therefore with a crystalline fracture. Our contemporary states that it has derived the explanation from a paper on testing chain cables, read last May by Mr. Paget, C.E., before the Society of Arts, and portions of which we, at the time, gave in our own pages.

OUR DOMESTIC STREET ARCHITECTURE.

The architectural conundrum proposed by "Art-lover" in the *Builder* (p. 671, *ante*), is apt to raise many and various thoughts with regard to our domestic street architecture. It is a sad fact, that while stately piles are being reared for commercial purposes,—while banks, insurance offices, and mercantile buildings vie with each other in nobleness of form, and richness of decoration, our private houses,—our homes,—are mean and plain, and sometimes even have actual appearance of poverty. Long brick walls, black with dirt and smoke, with rows of oblong holes for windows (certainly improved of late by the introduction of plate-glass), doors conspicuous only from their plastered jambs, areas in front protected from the pavement by hideous iron railings,—these form the fronts of our streets, gloomy, uninviting, nay, even repulsive. There is one variety, but that is worse even. I allude to stuccodom; the head-quarters of which are near Regent's Park, and a large and, alas! rapidly increasing colony gathering round the British Museum. There is something, however, about these stuccoed houses, which would make them preferable to the others. They are more *truthful*. Yes, stucco as they are,—lying deformities as they are,—they are more truthful, in a certain sense, than the naked brick. They show more what their interiors are: they, in their falsehood, reflect the falsehood of the rooms behind them. The stuccoed front is in keeping with the oil-cloth pavement, with the grained doors, with the marbled walls, with the plastered ceilings which conceal the construction of the floors and of the roofs. A lie without, by expressing a lie within, becomes a truth, but a very sad and reproachful one.

There is no feeling, no spirit in our homes. Look at the residences of the rich and titled in the west of London: they display no art: all the attractions they have are their fittings and finishings, put up with due regard for modern comfort and civilization. Civilization! Come from the west to the heart of London, and see a wine-merchant's warehouse, — the venerable Crosby Hall. Cut in two by a thoroughfare, loaded internally by a gallery used some years ago by the musicians in concerts, its blazoned windows dilapidated, and its interior decorations irretrievably impaired, it stands there a noble and impressive object, a monument of the taste of our ancestors, and a reproach to ourselves. It silently tells us how, nearly four hundred years ago, when our country had not one-fourth of her present population, nor one-tenth part of her present wealth,—a simple knight reared for himself, his children, his children's children, for his descendants for centuries, this stately home. And the grey walls seem to frown, and then sneer, while they remind us that our proudest nobles live in constructions meant to last for a limited time, then to be rebuilt, and then built again, for the present generation only; those to come, uncared for.

But, it may be asked, Do you wish to make Crosby Hall our model for imitation? Not at all. Crosby Hall was built in the beginning of the sixteenth century. This is nearer the end than the beginning of the nineteenth. It is not the building that I wish imitated, but the spirit that produced it. The same feeling that moved the good old knight to erect his beautiful hall should move us also. *He* meant his hall to last: cannot we mean the same with ours? *His* hall was a part of his inner self: he felt for it, and with it: why cannot we do the same? Who is there among us now who loves his house in London? who, for its own sake, is loath to leave it? We love a place for its associations, for its remembrances; but that is all, and not always that. I myself, within the last four years, have "moved," and live now but a quarter of a mile from where I used. Do I ever go and bestow a fond look on the old house with stuccoed ground-floor and pseudo-Doric plaster portico? The imaginary question is ridiculous. Were it real, I should be inclined to think the questioner insane. But this should not be so. We talk and sing about hearth and home, and we have no homes! We are, in fact, nothing but wanderers,—if not always actually, at least careless whether we are or not.

It is this apathy which makes our domestic buildings so void of solidity. It has this effect, not only in London, but in country towns where better things might have been expected. I was lately in the ancient city of Chester, and there a great deal of building work was going on. Most of the new buildings are in the style of the old; but, instead of modern resource being employed to render them more substantial and lasting, their increase of height has no corresponding increase of thickness; and the pitiable cry of expense cannot be raised here, for I saw quantities of wood-carving exposed on the exteriors, much of it *ecclesiastical*.

I will now endeavour to show what I think our town homes should be. Be it far from me to attempt to lay down rules on the subject. "*Chacun à son gout*," say the French; and I have no doubt I shall be sadly at variance with many, though I sincerely hope the fundamental principles upon which I work will be approved.

My house will be of the same size as most in London; three windows in a row, and three stories above the ground-floor, with a basement and open area in front. I will begin from the bottom. Firstly, then, the basement. This I would have more massive than the upper part, projecting a few inches by weather-mouldings. The windows should be rather broad, on account of the scarcity of light; and as this breadth would take somewhat from the appearance of massiveness, they should be divided into two or three parts by mullions or shafts, though I think the former are preferable. These windows, owing to the thickness of the walls, would have a deep splay, which should be left plain or nearly so. In fact, the greatest simplicity should be observed in the basement,—first, because it is the lowest, and therefore should be the strongest; and, secondly, because it contains the menial offices. Under the doorstep of the house should be the door of the basement: this should be arched, with a segmental or with an obtusely pointed arch; the door itself should be plainly painted with some dark colour. Alongside of this door should be another large window, to light the passage along the basement. This should be similar to the others, only it might be made lighter, as it has comparatively but little weight upon it. The weather-mouldings, mentioned above, should be *an external indication of the joists of the ground-floor*. Some houses have a small outhouse in the area against the wall of the house: this might be roofed with slate, and, well treated, would be a very pleasing object.

Rising from the area, we come to the area-railings. These I would send to the right-about, without compromise, and substitute a low wall, about 3 ft. in height, and of considerable thickness, with boldly projecting mouldings, and a stout iron gate for the area-steps. This wall should run all round the three sides of the area: at the angles, and, particularly where it meets the doorstep, it should become more substantial, and might be somewhat ornamented.

The doorstep I should like, if possible, to be covered in entirely, making the space so gained a part of the entrance-hall. There should be a narrow window in the side overlooking the area. The doorway should occupy the entire breadth of the hall, and should be arched. The walls of this projecting hall should be as thick as possible, to give depth to the splays of the window, and to the jambs of the door. These jambs should have rich mouldings. I consider that, in domestic architecture, the door should be more ornamented than any other external feature, as being by far the most important. The roof of the porch should be flat, and should form a part of the balcony for the first-floor. Should it be impossible to build such a porch, the doorway should be the same, excepting that a window should fill up the arch. The door itself would be best of oak; and if not that, of deal, painted black or invisible green.

I have not said what material I would use. The bulk should be brick, of a light colour if possible, with stone dressings in the basement story only. The area wall would look very well if made of stone.

The windows of the ground-floor usually light the dining-room: they should be lofty and broad. As the principle of *substance* would extend through the whole of the building, these windows would have deep splays, though of course not so deep as those of the basement. These splays should be moulded; and, should ornament be desired at all, the windows would be by far the most fitting objects of it: they might be square-headed, containing an arch, the spandrels of which might be filled up with stone carving, either natural or heraldic. I decidedly object to ornamental details being executed in brick: mouldings only should be the ornament in brick.

Above the ground-floor windows would come the balcony, which I would support on stone brackets instead of the microscopic iron affairs now in use. The balcony should have a light iron rail running round it, and round the top of the porch, which would form a part of the balcony, as I have said above.

The windows of the one-pair floor light the drawing-room, and are generally the largest in the house. The splays of these windows especially should be made as deep as possible, taking care that, inside, they are not flush with the wall. I think that the most inveterate supporters of sash-windows will admit that in a drawing-room opening on to a balcony they are not indispensable. They are, in fact, almost as much doors as windows, and should therefore receive somewhat of the treatment of doors. Their large size makes it almost a labour to lift them high enough to enable any one to pass from the room to the balcony; while, arranged as double doors, nothing could be easier; and their width, divided into two, would be far too small to cause any inconvenience inside the room.

Next above these windows would be a bold string-course marking the next floor; and then would come another row of windows, on which no remark, however, need be made. Above these would be another string, and then the top story windows, which, however, do require a few words to be said about them.

In the first place, the form of the roof must be considered; and the roof must depend a great deal upon the staircase inside the building. I would build the staircase projecting from the back of the house, and thus leave the body of the building clear, and save all trouble about the roof; but as this would in a great many cases prove impracticable, owing to the limited area at the back, I should prefer to keep the staircase *entirely within* the house, lighting it either simply by a skylight, or, with greater pretension, by a lantern. This skylight or lantern would fill up the interior and one side of the area of the top of the building, leaving three sides to be roofed. I would do this with a roof of uniform high pitch, for the better protection from the weather; and I should make this roof useful, by making it a part of the rooms on the top story, the windows of which would thus be partly in the wall and partly in the roof, and which would give great scope for variety in the designing of the dormers. On each side of the house I would have a wall, sloping down in the front and back by means of sets-off; but always being higher than the roof,—being, in fact, for the purpose of protection from fire. Resting on this wall would be the chimneys, the tops of which should be diamond-shaped, which would have a very good effect.

I have thus given my idea of what our street architecture should be. I have purposely avoided inclining to any style, but have expressed myself in general terms. I have introduced no parts unnecessarily, but have done my best to produce the most with the least. No doubt, I have committed several grave errors, and I hope that these will be conscientiously shown up in some future number of the *Builder*. But whatever objections may be raised against my remedy (which only professes to be empirical), nobody

will deny that the disease exists, and ought to be cured in some way or other. It is quite sickening to walk through the streets of domestic London, and see what Canova called the long brick walls, with rows of slits in them. Reform we must have, and, to be thorough, it must be founded on some principle. I think that the great root of all evils now existing is the want of substance, and I have made substance the great principle in my plan for reformation. Several other remedies might be proposed, but as yet I think that more substantial construction is the best. Next to substance I have made bold horizontality the most important feature. When buildings rise 80 ft. in height, some horizontal lines are necessary to correct this. I have made my horizontal lines show the position of the floors, and thus rendered the exterior an index of the interior. Ex Stirpe.

WASTE LANDS, SEWAGE, AND EMIGRATION.

During the last 100 years, agricultural skill and knowledge have advanced throughout Great Britain in a most remarkable manner. Wide spreading tracts of marsh and moor have been converted into profitable lands. In the southern parts of Scotland, even within the past quarter of a century, the changes have been great and the progress satisfactory, as in steam machinery for preparing food for cattle, sheep, &c., for thrashing corn, and for ploughing, or otherwise preparing the land.

We believe, however, that we are on the eve of the introduction of measures which will have a greater and more beneficial effect on agriculture than anything that has been done during the present century: we allude to the safe and cheap application of town sewage to the cultivation of the soil. The best mode of doing this on a large scale has not yet been ascertained; nor do we think that the effect upon the health of towns, of collecting immense masses of sewage in their vicinity has been clearly shown to be unobjectionable; but it is not likely that these problems will be solved except by actual experiment on a scale of sufficient extent. If these experiments are brought to a successful issue, however, this will be the means of putting into use vast quantities of land at present comparatively useless, and greatly increase the native production of human food:—it would also increase materially the demand for agricultural labour,—a point of much importance when the gigantic extent of the emigration going on from the British islands is considered. Month by month, great ships carry away multitudes, composed for the most part of the cream of our industrial population,—not to our own colonies alone, for great numbers seek their homes in the United States, which are in constant rivalry with, and often show anything but a friendly feeling to, the mother country.

In the six months ending last June, 123,000 persons, chiefly consisting of the working population, left these shores. In Ireland, instead of an increase of population, there has been, in thirty years, an actual decrease of nineteen per cent.; and even in the last ten years, a decrease of twelve per cent. In 1841, the population of Ireland was 8,175,124: in twenty years this number has declined to the extent of 2,401,587. This state of our population is a matter which demands grave thought. There are immense tracts of waste land at home which might, if proper facilities were held out, be improved so as to provide for a large amount of labour. In England alone, the waste land consists of nearly *seven million acres;* in Wales, 1,635,000; Scotland, 14,473,000; Ireland, 7,316,664; in the British Islands, 735,569; in all 30,871,563 acres of waste land. These figures show that within a comparatively limited space, and close to our own markets, we have lying absolutely waste, the enormous extent of nearly thirty-one millions of acres of land, which, as a contemporary observes, would give about an acre of ground to every one of our population, or five acres to every family. Are there no means as yet available by which this loss can be prevented? Might not tracts be selected by way of experiment, and offered, in allotments, on advantageous terms, to those of honest and industrious character, who would like to remain at home instead of crossing the seas? In the colonies small pieces of land are granted for trifling sums,—in some instances for nothing,—provided that within a certain time stipulated improvements have been made; and it does not seem unreasonable to suppose that if the needful measures were taken, many would devote their energies to the cultivation of land at home instead of going to some more distant clime.

No doubt, the labour would often be hard and the difficulties great; but let a man go where he may,—to the colonies or elsewhere,—to struggle for the means of independence and comfort, he cannot succeed unless he works long and steadily, and endures much privation. There are now throughout this country facilities of railways and other means of transit not in existence a short time ago, which would materially lessen the troubles which would necessarily have attended the carrying out of any scheme of this description formerly; and should the right mode of applying town sewage to the soil be at length ascertained, further cause for emigration on the part of our argicultural labourers might soon be in a great measure obviated.

FACILITIES FOR TOURISTS.

Wonderful as are the means at present in use for those who have time and disposition to see the beauties and curiosities of their own and foreign lands, these facilities are constantly increasing; and in the columns of the newspapers we see tempting advertisements of cheap excursion trains, which go in all directions.

From Blackfriars Bridge we may now daily go to the Crystal Palace, Ramsgate, Herne Bay, Broadstairs, Chatham, Stroud, Sheerness, &c.; or we may make a cheap excursion from the same place, or from the Victoria or London Bridge stations, to Calais and back; seeing, besides other matters by the way, the white cliffs and noble castle of Dover: this can be done for 7s. 6d. From the metropolitan station of the Brighton railway, the tourist may take cheap excursion tickets to Paris, which is reached in eleven hours and a half: by third-class the fare is 22s., or return ticket, available for a month, 36s. From the Euston-square station, cheap summer excursion trains run frequently. The fare from London to Windermere and back is 15s. On Sundays, trains start from the Charing Cross station by means of which persons are enabled to spend eight hours at Boulogne, and return on the same night,—fare there and back, 7s. 6d.; children under twelve years of age half price: so that the Londoner, at a very moderate cost and little loss of time, may speak of his visit to the Continent.

Cook's monthly tickets are available for express and ordinary trains and steamers to Paris and Switzerland: the cost of conveyance from London to Switzerland, and thence home, is, by first-class, 5*l.* 5s.; second-class, 4*l.* 14s. This gentleman has also planned excursions to some of the most interesting parts of Italy. He accompanies these excursions, and leads his companions to spots of the greatest interest, and to picture-galleries and libraries, thus saving trouble and delay; and also finds accommodation and local conveyance at moderate cost. All these facilities, it is true, deprive travelling of much of its romance; but for the man of business and for those whose summer holiday is limited to a short period, the plan has advantages.

The Great Western has excursion trains which start to the north, dropping passengers at Oxford and Banbury, Leamington, Warwick, Birmingham, Shrewsbury, Oswestry, Llangollen, Liverpool, Manchester, and many other places; and a similar arrangement is made respecting towns in the direction of Falmouth and Penzance; but the mere enumeration of the tempting routes which are made cheaply available by the railways would far exceed our present limits. All this contrasts in a remarkable way with the methods of travelling thirty or forty years ago. Nor do those increased facilities apply to rail alone; for the Londoner who may have an inclination for the sea may have that taste gratified, and in a short time may steam to St. Helena and back, and derive from the journey both health and pleasure. Or he may go direct from London to Norway, the fare for the chief cabin being 4*l.*, or 6*l.* return. Or he may go to Jersey, Guernsey, or St. Malo. Those who choose may take a steam yacht excursion round the sea coast every Sunday; the fare of the railway and yacht being 6s. 6d. It is a nice little voyage to Ipswich, Harwich, Dovercourt, Felixstowe, and Walton-on-the-Naze. Those with less spirit of adventure, or smaller means, may spend a pleasant day by making a trip from Hungerford or London Bridge to Sheerness, sailing round the Great Eastern and the ships of war in the Medway.

SURVEYORS' FEES UNDER THE BUILDING ACT.

Mr. Geo. Vulliamy, as superintending architect of the Metropolitan Board of Works, has made his eighth annual report on the monthly return of district surveyors.

A general abstract of the returns of fees for the year 1863 is appended to the report, along with a list showing the comparative revenues of the several districts into which the metropolis is divided.

The total of the gross fees for the year is 29,440*l.* 9s. 9d., received in respect of 17,954 works, of which upwards of two-thirds were done within the year.

The gross fees received in 27 districts vary from 54*l.* to 384*l.*—8 being under 200*l.* each, 6 under 300*l.*, and 13 under 400*l.* each. In 28 districts the incomes vary from 400*l.* to 1,545*l.*

The expenses of district offices are 5,793*l.* 19s. The fees remaining due for all arrears are 20,443*l.* 11s. 6d., but probably mostly of little value. The sums abated or lost are 1,178*l.* 4s. 7d.

Compared with the results of former years, the present abstract shows a large increase.

	Works.	Fees received.
In 1856 ...	14,654 ...	£19,904 14 11
„ 1857 ...	15,330 ...	20,969 11 4
„ 1858 ...	15,500 ...	21,732 11 2
„ 1859 ...	15,558 ...	22,385 9 2
„ 1860 ...	15,030 ...	22,791 2 3
„ 1861 ...	14,008 ...	21,586 2 8
„ 1862 ...	15,707 ...	25,315 2 3
„ 1863 ...	17,954 ...	29,440 9 9

ARCHITECTURE IN UNIVERSITY COLLEGE, LONDON.

Professor Donaldson has issued his sessional circular, and takes the opportunity as usual to offer some remarks for the consideration of students themselves, and of those who take interest in architecture and construction,—the result of his experiences. He says truly,—"After all, the main question must be not how much is taught, although that is essentially important, but how much is learned by those who attend such courses. Discipline, kindness, earnestness, and confidence in the right on the part of the teacher will do much to create habits of attention, to arouse the faculties, and to create a deep interest in the topics treated upon. But on the part of the student it will be asked how much has he done with a little honest hard work to avail himself of the painstaking devotedness of the professor? How many evenings of the week does he devote to follow up the instruction given, and to perfect his notes of lectures and sketches of the illustrations? What books on the art has he read in furtherance thereof? and in what fruitful mode has he made himself master of the works that he may have consulted."

"There has been a specious popular outcry in regard to architecture fostered by public writers, and very much the result of ignorance, and which has induced an impatience of the control of rules in art, an ostentatious disregard of authority and a craving for novelty.

By some it is stated that a mistake lies in retaining the Greek and Roman as the standard, and that the youth had better devote himself to the Gothic style, as the more patriotic, Christian, and reasonable, and above all unfettered. I have more than once entered my protest against such narrowminded convictions; for I think that no architect should regard his art under an exclusive and *sectarian* point of view, but with a generous and universal spirit, rendering justice to *all* the varied phases which art has assumed in different countries, and at various epochs, and neglecting none."

NEW GAS-LIGHTING APPARATUS.

Mr. T. C. Eddy and Mr. M. Burdon, of Durham, have brought out an apparatus for lighting gas, intended to obviate the necessity of its being done by hand. It is called the "Electro-magnetic gas-lighting apparatus." The invention may be applied to any description of gas-lamp without their requiring alteration. The apparatus is about three times the size of a lady's thimble, and very much like an ordinary gas-burner. The principles upon which it is based are stated as follows:—An ordinary telegraph wire communicating with the negative pole of a galvanic battery is connected with the "Electro-Magnetic Burners" in succession, according to the number of lights required, and the extre-

mity of the wire communicates with the earth, or is conducted back to the battery, and attached to the positive pole, when the circuit is complete. Therefore, to light and extinguish the lights, it is only requisite to connect or disconnect one of the poles of the battery. Immediately the electric current enters the "Electro-Magnetic Burner," it passes through an insulated wire, which is lapped round a soft iron tube, which immediately becomes a powerful magnet, and attracts a piece of soft iron, which opens a kind of valve, and permits the gas to escape through the burner: at the same time the gas-valve is opened, the current passes through a piece of platinum wire close to the burner, which turns red hot and lights the gas. This effect is produced at every burner at the same instant.

WHO'S WHO?

The tremendous flood of photographic portraits which is now thrown upon the public is extraordinary, and leads to no little imposition and to some confusion in the great markets of the poorer classes of the metropolis. In the New-cut, Lambeth; the Brill, Somers Town; and in other busy places, the photographic effigies of the men of the day are sold in enormous numbers. Certain faces are so well marked and so familiar, that no mistake can be made; but there is many a man of mark whose visage is not generally known to the multitude; and in these cases great imposition and confusion take place; and portraits of learned professors, ministers of state, and even royal personages, are sold as that of the man of the moment, even though he be a murderer. Recently there has been a remarkable instance of this: the extraordinary excitement in connexion with the murder of Mr. Briggs has caused an immense demand for the photographic portraits of Müller, the suspected murderer; and on the Saturdays, in the markets mentioned, a familiar cry is,—"Portrait of Müller—only a penny!" "Here is the authentic portrait—only a halfpenny!" On examining the proffered sun pictures, we found amongst them the familiar features of Professor Owen, Sir Roderick Murchison, the Archbishop of Canterbury, the Crown Prince of Prussia, Prince Louis of Hesse, and many others. The morbid taste which has given to Müller a passing notoriety as great as that of famous warriors and statesmen will be the means of clearing out the otherwise surplus stock of many a photographer and seller of photographs; but persons of fame and respectability will at the same time have their portraits imposed upon the public as that of a man charged with a foul crime, and whose features do not belie the charge.

ST. JOHN'S, NEW BRUNSWICK.

Our correspondent writes from this colony,—Thus far, this has been a very busy season in our line, perhaps more so than any for the last ten years: a large number of first-class buildings, both public and private, have been erected or are in course of erection, of which I shall only mention the recently-erected dwelling of Mr. George Carvill. It is of red brick, with grey freestone dressings, and is one of the largest dwellings in our city. A building in course of erection, of red freestone with grey dressings, much smaller in size (though not in pretensions to architectural beauty) than the former, is owned by one of our most extensive builders, Mr. E. J. Barteaux. Of the stores, that belonging to Mr. J. R. Ruel, and the larger one of Messrs. Daniel & Boyd, are the principal.

We are getting well along with the new Germain-street Baptist church, on the site of the old one, pulled down to make room for its more pretending successor. It is of the Gothic style, of the fourteenth century, with slight adaptations. It is small in size, being only 50 ft. by 75 ft., with tower and spire, 160 ft. to vane.

It is built of red stock brick, with grey freestone rather freely used. The spire will be of wood. Messrs. Hart & Sons, of your city, supply the ironwork, as we have no art-workmen in that department. The architect, Mr. John A. Munroe, hopes to make this the finest Protestant church in the city.

Our Government is making extensive railway improvements in the city, having just commenced a deep water terminus of great extent for a city like ours; but we are growing fast, and will need all by and by. The work is being executed from the surveys and under the superintendence of Mr. J. E. Boyd, chief engineer of railways in this province. There will be an exhibition of provincial productions opened at Fredericton, on the 4th of October, and it promises to be very successful.

Gold and marble have just been discovered in this province, the latter of very fine quality, of various colours, and in great quantities, it is said. The gold I have seen specimens of, but the marble I have not, so I cannot judge. We have freestone of the finest quality, and if we can get marble in any quantity we will soon have the latter in as extensive use as the former. There is a convention sitting at Halifax, trying to bring about a union of the British North American provinces; I wish it every success.

THE REMEDY FOR OVER-CROWDING.

Sir,—I have read with much pleasure and profit your able paper on over-crowding; and having also enjoyed the advantage of reading most of your previous works on these sanitary sins and sorrows of the City, I think, perhaps, you will allow me to make two brief observations on the subject.

1. In the first place, your observations and researches (which entirely coincide with those I have made in a more limited field) would seem to establish beyond a doubt the necessity of a thorough-going and systematic inspection of the poorer class of dwellings.

2. But as you do not indicate the method of inspection otherwise than as an extension of the Lodging-houses Act; and as the power of appointing inspectors under that Act rests with the "local authority;" I wish to state, in the second place, that I do not think such local authority either competent or proper to exercise this power; and that if you wish inspectors to be honest and impartial in the imperative discharge of their duties, you must place them beyond the reach of local influences altogether. Such was the view taken by Lord Derby's committee regarding the inspectors of nuisances under the Alkali Works Bill. I speak from my own experience. An Inspector.

*** Our correspondent is right in his inference, but not wholly so in his premises. The execution of the Common Lodging-house Act within the metropolitan police district is vested in and well carried out by the Police Commissioners of the metropolis, to which body we would confide the appointment of inspectors of tenemented houses.

SLATING.

Having had twenty years' practical experience in the trade, and opportunity of observing provincial custom, I give you the result of such observation.

Slates are now without exception secured to battens (about 1½ in. by ¾ in.) by two nails at a distance of 13½ in. from the bottom (such distance being regulated according to the pitch of the roof), and not at the upper end. The exposure to wet being from the vertical joint, copper nails are confessedly preferable, although Vieille Montagne zinc, and sometimes malleable iron, are used when repairing old Westmoreland grey slating, which was secured by an oak peg in the centre of the upper end, which is generally round. I have observed a dry rot in the slate, rendering the peg useless. The peg is still used in Yorkshire, where roofs are covered with a thin stone, about 1 in. thick; but for Bangor, Port Madoc, Llangollen, and other blue slates, the custom of the trade is to nail the slate "the distance of the gauge, plus the lap." The superiority is evident from the position of the nails. By mechanical laws the power over bodies is increased by extension of leverage; and so, in this instance, instead of a lever of about 23 in., the power is reduced to about 13 in., with a counter force in the lath on which the head of the slate rests. S. C.

THE SURVEYORSHIP OF WEYMOUTH.

Sir,—At the meeting for the election of a surveyor for the borough of Weymouth and Melcombe Regis, last Wednesday, a local man was appointed to the office. There were thirty-two applications; but the town council actually did not open one—an unheard-of proceeding, which ought to receive the greatest censure. They were bound in common justice to have perused them and selected the most fit and proper person for the office. I ask, why did they advertise for applications, when it was already known who would be appointed? It appears that most of the members of the council are led by one man, and instead of the welfare of the town being considered, it is party spirit. Fairplay.

SUGGESTIONS FOR THE NEW STREET.

I beg you will, through the medium of your journal, call the attention of the authorities interested in carrying out the new street from Oxford-street, through the heart of St. Giles's to Charing-cross, the Act for which was obtained last session, to the rare opportunity it affords (by a competition among architects) for fully developing the renowned Chester-row feature, with all its glorious artistic effects of light and shade, allowing the highest graces of art being lavished on every variety of arcade, pediment, pillar, pilaster, frieze, and embellishment of the truest constructive architectural character; while no better opportunity could be desired for a display of the picturesque element, by varying the elevation of each block of houses, or of even nearly every house, as in the new Cockburn-street, Edinburgh.

In the new street all the grandest features of the Venetian palaces might be emulated, as well as the Rialto and other bridges in the streets to be spanned, for making the covered promenade continuous from end to end of the street, of course providing good access to all the intersecting thoroughfares.

When you reflect on what might be done with all the modern appliances of wrought and cast iron, terra-cotta, encaustic tiles, Lucca della Robbia and other ceramic ware, and with a right development of the wood-carver's art, you will see a result might be attained that would fairly enter into rivalry with the far-famed human and animal sculptured decorations of a structural character that still exist on the fifteenth and sixteenth century houses of Italy; whilst, for the most important edifices in the line, frescoes might be introduced, with the highest artistic effects, in the ceilings, pilasters, &c., of the lofty arcade.

I venture to say, if such a plan could be carried out, it would exercise the most powerful influence in promoting a love of the arts, and an improvement in the skill of the artisans, whilst adding to the value and business attractiveness of the street.

Vast improvement in stone carving has been brought about in a few years by its free introduction as a structural decoration on the fronts of our new hotels and warehouses, and an amazing increase in stained glass workers, caused chiefly through the press arousing the public mind to the elevating use made of those arts in the countries where the mind and manners of man have been developed in their grandest forms in past and present times. English oak or walnut wood sculpture and carvings might be made a much more important adjunct of decoration on the elevations of our new banks and other houses of business, and would give a characteristic charm of noble yet picturesque beauty no other material can produce.

With good designs from architects and sculptors, proper models to guide and assist the young students, and the aid of steam machinery, as well as an enlistment of the surplus male and female labour, the supply of carving at a reduced rate of cost, might be soon secured to meet any increase of the demand, the establishment of such an example as the new street would give rise to.

At all events, the publicity of the idea in your journal might lead to an elegant embodiment of it in a few drawings for the next architectural display at the Academy.

George Lock, Designer.

ASSESSMENT OF GAS COMPANIES.

At the Glasgow Appeal Court, the Glasgow Gas-light Company appealed against the valuation of the assessors.

Mr. Donaldson stated that the company had been allowed all the deductions which they claimed, with the exception of the depreciation of meters. These deductions reduced the valuation by about 400*l*., leaving the estimated value within the Parliamentary boundary at 20,397*l*.

Mr. Allardice, who appeared for the Gas Company, said the ground on which he opposed the valuation was not upon the question regarding the meters, but upon the general principle upon which the valuation was made up. The assessors took as the basis of the valuation the revenue and expenditure of the company. The Gas Company was a company established by Act of Parliament for the manufacture and sale of gas, and was therefore just a manufactory, and should be dealt with in the same way as other manufactories, the profits realized from which were never gone into by the assessors. In support of his argument, Mr. Allardice referred to several cases disposed of under the Poor Law Act.

Mr. Donaldson maintained that the practice all over England was to take the revenue into account in estimating the value.

Mr. Govan said the Gas Company was a public company, authorised by Act of Parliament to levy rates, which a private company could not do.

The Court dismissed the appeal.

CHURCH-BUILDING NEWS.

Cheddleton (Staffordshire).—The parish church has been restored. The pews have been swept away, the plaster ceilings pulled down, the roof repaired, the floors relaid, the foundations underpinned, and the stone-work renewed where absolutely necessary. The only external alteration, besides the addition of the vestry, is the restoring of the gabled roof to the north aisle and the completion of the tracery of its east window, which had been cut off when a flat roof was put on. In the interior the change is great: the pews have been replaced by oak benches, and the chancel is separated from the nave by a high screen, which now forms the principal feature of the interior. It being doubtful whether there had ever been a chancel arch, it was thought desirable to mark the distinction of nave and chancel by a screen of this description. Four of the windows of the chancel have been filled with glass by Messrs. Morris & Marshall, of London. The designs are taken from the fragments of original glass which were still left in the windows. All the old fragments have been worked up in the new windows. The figures which occupy the windows are all said to have some connexion with the dedication of the church. They represent kings who have been sainted, or have been connected with church history. In one are Constantine and his mother, St. Helena; in another St. Charles and St. Louis; in the third, Ethelbert of Kent, and Peada of Mercia; and in the fourth, Alfred the Great and St. Edward, the church's patron saint. These four windows are the gift of the Lady of the Manor. These windows consist in great part of grisaille glass. In one of the windows of the north aisle a painted glass window has been placed by Mr. Nall, of Leek, as a memorial of his daughter, the late Mrs. Edwin Heaton. The subjects are taken from the 23rd Psalm and the parable of the Good Shepherd. The organ, which is being built by Mr. G. Walker, of London, is to stand at the east end of the south aisle, where an old footpace and piscina are visible. Mr. Thomas Wardle has placed in the tower a sixth bell, to commemorate a deceased member of his family. The old churchyard cross, part of the shaft of which alone remained, is to be completed and finished with a suitable cross. This is also the gift of Mr. Wardle, who is one of the churchwardens. The church has been warmed by Hewens, of Leamington, on the Mitchell plan of fire-boxes and flues below the tiling. The whole of the restoration has been under the supervision of Mr. G. G. Scott, jun., the son of the well-known architect. Mr. Evans, of Ellaston, was the contractor; and Mr. J. Saville, the clerk of the works. The total outlay, it is expected, will be about 2,200*l.*

Worcester.—In less than a month the work of restoring the tower and the northern portion of the Cathedral will be commenced by Mr. Hughes, of Bristol, whose contract has been accepted by the Restoration Committee, the terms being under 10,000*l.* It has been estimated that the total sum required for the completion of the restorations and improvements will amount to 32,000*l.*, and of that sum 16,223*l.* have been contributed. —— At a vestry meeting of the parish of St. Nicholas to acknowledge the gift of 2,000*l.* from Mr. W. Perrins for increasing the endowment of the church, a resolution was unanimously passed that this is a fitting time to restore and reseat the church.

Kimberworth (near Rotherham).—Operations are now going on for the enlarging and beautifying of Kimberworth Church. It was built in 1838, but its want of architectural beauty has prevented its becoming an object of interest. The interior of the church has presented as uninviting an appearance as the exterior. It is proposed to build a square tower, some 70 ft. high, at the west end of the church. On the north side of the tower will be an organ-loft, and on the south side the entrance-porch. The high gallery across the west end will be removed, and all the extra space obtained will be thrown into the body of the church. By this plan the church will be lengthened nearly one-fourth. The new sittings secured will be unappropriated, and it is hoped, eventually, all will become free. It is estimated that, to carry out these improvements, about 400*l.* will be required. Of this sum 50*l.* have been subscribed by the Earl of Effingham, and 50*l.* by the Earl Fitzwilliam. Mr. R. J. Bentley has given 25*l.*, and other sums are promised. The church is built in the plain Gothic style, and the architects (Messrs. Blackmoor & Withers) will carry out the same style in the tower. Mr. Ripley, of Masborough, is the contractor.

Grantham.—A numerous and influential meeting of the gentry and tradesmen of Grantham and neighbourhood has been held in the Townhall, Grantham, to concert measures for the restoration of the parish church. Earl Brownlow occupied the chair. Mr. Scott, he said, had thoroughly examined the fabric, and prepared a report. The alterations and restorations he recommends will cost about 14,000*l.* Mr. Scott had spoken of the spire of Grantham Church as only second to Salisbury Cathedral. To give effect to the resolutions passed at the meeting, Sir John Trollope proposed that a subscription for the restoration of Grantham Church be commenced forthwith. The subscription list now amounts to 6,000*l.* The stonework, according to Mr. Scott's report, is in good preservation, but requires careful reparation throughout. The internal surfaces require cleaning from whitewash. The south-eastern angle of the church must be underpinned, and otherwise strengthened, as it has given way considerably. The two porches require extensive repair and restoration. The general system of reparation spoken of as necessary to the stonework, must be applied, continues the report, to the tower and spire; and, while the scaffolding is up, it would be desirable to restore the upper portion of the spire to its original height, several feet of which have been lost through unskilful reparation. The foundations of the church should be examined throughout, repaired where they are found to require it, and protected from damp by concrete, a stone channel being formed all round, and the whole system of drainage rendered complete and effectual. No part of the roofs, excepting that of the nave proper, retains the original pitch. Every portion is, more or less, in a state of decay. Mr. Scott thinks that, in this case, it would be best to renew the whole of the roofs, restoring them to their proper pitch. The whole of the interior will require to be refitted.

Consett.—The foundation stone of a new church, according to the *Newcastle Courant*, has been laid at Consett, which, until a short time ago, was in the parish of Benfieldside. Consett having been made into a separate ecclesiastical district, a school-room, near the Consett Iron Works, was used temporarily as a church, until means could be obtained for erecting a church. A site was selected for the building west of the village, and there the first stone of the new edifice, which is to be called Christ Church, has been laid. The church will be built of stone, in the Early Norman style, from designs by Mr. Corey, architect, Carlisle, and will be quite devoid of ornamentation. It will consist of the nave, chancel, and north aisle, with a low tower at the west end, which it is intended shall be surmounted by a spire. North of the chancel will be an organ chamber and vestry. The nave will be so built that, should the congregation require it, a south aisle can be added, of the same form as that of the north aisle. The principal entrance is from the west end, beneath the tower, and it will be the most ornamental part of the building. The extreme length of the church will be 137 ft., the chancel being 26 ft. long; the width 54 ft.; and the height of the roof of the nave 35 ft. The tower will be about 40 ft. high, and the spire about 30 ft. more. The church will be fitted with open benches, to accommodate 520 adults and 100 children. The roof will be of open timber, and the aisle will be separated from the nave by six arches. The cost of the building will be 1,825*l.*, of which 600*l.* require yet to be raised. The contractor is Mr. Lowes, of Durham, builder.

DISSENTING CHURCH-BUILDING NEWS.

Plymouth.—The Sherwell Chapel, a large structure in Tavistock-road, Plymouth, for the increased accommodation of the Congregationalists, has been opened for divine service. A prominent feature of the structure is the tower, surmounted by a spire, being about 140 ft. from the ground to the top of the vane. The design is Gothic, with details of the Second Pointed period. The front of the chapel is parallel with Tavistock-road, and set back 10 ft. from the line of boundary. A flight of steps leads to the central front entrance, vestibule, and lobbies, communicating with the ground-floor seats, side entrances being provided to the galleries, that on the north side being under the tower. The centre front gable is flanked by enclosures to the gallery staircases. Over the south staircase there is an octagonal roof, corresponding in position with the tower on the opposite side. Above the central front doorways is a five-light window, with traceried head. The side windows are in two tiers; the lower range beneath, and the upper range above the side galleries; and all have geometrical tracery. Internally, two rows of iron columns, 6 in. in diameter, and coupled transversely, with 3-in. space between, and 13 ft. apart, divide the whole width of the chapel into the three compartments of the aisles. The capitals are surrounded with leafage. Above the columns are pointed and moulded arches, five in number, on each side and supporting the central or nave roof. The roof is constructed so as to show the inner ceiling, with sloping sides, divided into compartments by moulded timbers and hammer-beam trusses. The roofs over the aisles are similarly treated, the spaces between ceilings and roofs being made available for the purposes of ventilation. The side galleries are four seats deep, exclusive of passage next the walls, and the end gallery extends over the front vestibule, and contains a large number of sittings. At the western end is an apsidal recess, occupied by the organ, which is being built by Mr. H. Willis, of Regent's Park, the builder of the great Liverpool organ, and of those of Wells and Winchester, the latter being the Exhibition organ of 1851. It is a full church organ, containing three manuals, from double C to G. The organ front, which is of polished oak and carved, was manufactured by Messrs. Yabsley, of Plymouth. In front of the organ recess is a platform 18 ft. by 16 ft., with carvings and railings decorated with ironwork. The pulpit is in the Gothic style, and consists chiefly of pitched pine fir, varnished. The transepts have ceilings of semi-octagon shape, which abut against the nave arches, to prevent the acoustic defects generally accompanying transepts. Underneath the organ-recess is a chamber for Haden's warm air apparatus, and in the rear are vestries for minister and deacons, adjoining each other. Accommodation has been provided for about 1,200 persons, of which number about 700 are on the ground floor. Additional accommodation can be provided, if required, by enlarging the transepts. The dimensions of the chapel internally are 53 ft. wide, 94 ft. 6 in. long (exclusive of apsidal recess, which is 15 ft. additional), and 48 ft. from floor to apex of ceiling. The side walls are 30 ft. high from floor to plate, and the front gable is 75 ft. high from the ground surface to the top of finial. Portland stone has been used for all tracery and delicate dressings, and for the spire; and the walls are built of native stone and lias lime, faced with limestone of dark colour, ranged in courses and pointed with dark mortar. Light-coloured limestone has been used in bands and for all quoins; and the relieving arches over all doorways and windows are varied in voussoirs of purple slate and red limestone. The roofs are covered with Welsh slates in bands of red and blue. The building has been erected by Mr. John Finch, of Plymouth, under the superintendence of Messrs. Paull & Ayliffe, of Manchester, who were the architects, Mr. Mayjor, of Plymouth, being clerk of the works. The cost will be over 6,000*l.*

ROMAN CATHOLIC CHURCH BUILDING NEWS.

Hoxton. — The foundation-stone of a new Roman Catholic Church has been laid at Hoxton. The edifice is dedicated to St. Monica. In connexion with the site of the intended building we may mention that the house No. 12, Hoxton-square, now standing there, is at present occupied by the Augustinian Fathers. In the time of Charles II., it is said, this house was the resort of that monarch, and there are in relation to the old red brick building various tales of Nell Gwynne. In the course of the necessary excavations in the grounds attached to the house, traces were found of a subterranean passage—in some parts quite complete, with brick walls and arched roof—leading, it is imagined, to York House, a place not far distant at that period, and another of his Majesty's oft-frequented spots. This is the first Augustinian church in London since the time of Henry VIII. The new edifice is to be 124 ft. in length by 40 ft. in breadth. The plan is a parallelogram, and the building is divided into nave and aisles by pitch-pine columns, which support the main principals of the roof. The nave is separated from the chancel by an arch ornamented with marble shafts. The chancel is lighted by nine windows,—eight lateral lancets

and one rose window. Beneath the window the chancel opens upon the side chapels by an arcading of eight arches supported on small stone columns. The roof of the chancel will be waggon-headed, and divided into panels by wooden ribs. The roof of the nave is open, with ornamental metal work. The nave is entirely lighted from a clerestory worked in Bath stone. Behind the sanctuary is a sacristy 40 ft. long by 12 ft. in width. The height of the building is 51 ft., and it will cost, when completed, about 3,300*l*. Mr. Oxborn, of Clapton, is the contractor; and the architect is Mr. Welby Pugin.

Barnet.—A new Roman Catholic Church has been commenced at Barnet, the first stone being laid by Bishop Morris. The church is to be Gothic in character, and the architects are Messrs. Willson & Nicholl, of London. It will be about 50 ft. long by 32 ft. wide, and will accommodate about 200 persons.

STAINED GLASS.

Chichester Cathedral.—Almost all the lower windows of the building are already filled with painted glass. There are only four plain windows left in the nave aisles, and one of these is about to be filled with stained glass. It is to be a memorial window, like most of the others, the glass being manufactured by Messrs. Clayton & Bell, of London.

St. James's, Dover.—This church has received recently an addition to its numerous other embellishments in the shape of a stained glass window, which has been inserted in the west end of the church, immediately above the cross gallery. It has been placed there, we understand, at a cost of 400*l*., and is intended by the building committee to serve as a memorial of Lady Morrison, who rendered valuable assistance to the funds for the erection of the building. The window consists of five principal lights, each containing two Scripture subjects taken from the Old Testament, and intended to illustrate the chequered experiences of the Israelites of old; while underneath are passages of Scripture showing their spiritual meaning. Surmounting these are seventeen lesser lights, two of which seem designed to represent the creation of our first parents; and lower down, over the centre of the larger compartments, appear the initials "I.H.S." The artists are Messrs. Heaton, Butler, & Bayne, of London.

Hereford Cathedral.—A window in memory of the late Archdeacon Freer, according to the local *Times*, has been erected in the north transept. The window has been designed and executed by Messrs. Hardman, of Birmingham. The cost is about 1,300*l*. The window is one of the largest of the Geometric period (temp. Edward I.) in this country, the glass being 48 ft. 6 in. in height, by 21 ft. 6 in. in breadth. The predominant colours are ruby and Canterbury blue (about five or six shades of each). Plain white glass has also been largely used in the upper part of the window. The details of the new glass are in accordance with the architecture of the north transept. The various medallions are filled in with a variety of figures representing Piety, Fortitude, Knowledge, Counsel, Wisdom, &c.; "St. Paul before Festus," "St. Peter and St. John confirming and enlarging the Church in Samaria," "St. Stephen distributing Alms," "St. Philip baptising 'a Man of Ethiopia,'" "Angels with spiritual Armour," "The Crucifixion of our Lord," "Our Lord sending forth his Apostles to establish the Church," "St. John the Baptist preaching in the Wilderness," "Martyrdom of St. Stephen," "St. Peter healing Æneas of the Palsy," "St. Paul shipwrecked," "St. Peter imprisoned by Herod," "Angels crowning the Just," &c., "The Heavenly Jerusalem," and other subjects.

Wellesbourne Church (*Warwickshire*). — A stained-glass memorial window has been fixed in the east end of this church, containing the following subjects, viz., the "Annunciation" and "Nativity," and in the centre opening, the "Crucifixion," under canopies; and on pedestals under the above the subjects of the "Baptism," "Christ before Pilate," and "Last Supper." On a brass plate at foot is an inscription to the memory of Cecil Henry Paulet, son of Lord Charles Paulet. The window was executed by Mr. W. Holland, of Warwick.

Wherstead Church, near Ipswich.—The west window of this church has been filled with stained glass, executed by Mr. W. Holland, of Warwick. It contains four subjects in side-lights, representing the Acts of Charity, under floriated canopies, and in the centre opening "Our Saviour healing the Sick," with angels on pedestal bearing a scroll, with the words "He healeth all thy diseases." In the tracery are figures of the four Evangelists, with their appropriate emblems, the Lamb, pelican, I.H.S., &c. Running across the bottom of the window is the inscription, "To the memory of Sir Robert Harland, bart., of Wherstead Park."

Halifax Church.—The pupils of the late Rev. John Henry Gooch, incumbent of Stainland, and head master of the Free Grammar School of Queen Elizabeth at Heath, have erected a painted window, in memory of their late master, in Halifax parish church. The window is Perpendicular in style, and formed of three openings and tracery. The subject, which is extended over the three lights, is taken from St. Luke iv. 32, "And they were astonished at his doctrine; for his word was with power." The whole is the work of Messrs. Edmundson, of Manchester.

St. Matthew's Church, Knott Mill, Manchester. The teachers and scholars connected with the schools attached to this church have subscribed to defray the cost of two painted windows which have been placed in the sides of the chancel. The style is Perpendicular, and each window is composed of three lights and tracery. In the centre opening of one window is a representation of the Saviour blessing little Children; and in the side-lights, life-sized figures of the Evangelists Matthew and Mark. The second window contains "Christ's Charge to Peter;" and in the sides, figures of St. Luke and St. John. These windows were executed by Messrs. Edmundson, of Manchester.

Peterborough Cathedral. — A stained glass window, the production of Messrs. Heaton, Butler, & Bayne, of London, has recently been placed in the north transept. The subject in the sinister light is "Christ's Agony in the Garden;" and in the dexter light, "Soldiers and Rabble, with Judas at their Head;" beneath, the "Disciples asleep;" and in the tracery, "Angels holding Emblems of our Lord's Passion." This window was erected by Mr. G. W. Johnson, of Peterborough, in memory of his mother, Margaret Johnson.

FROM SCOTLAND.

Glasgow.—The extensive ship-building firm, Messrs. Tod & M'Gregor, whose works occupy a site of 14 acres at the confluence of the Clyde and the Kelvin, have found it requisite still further to extend their accommodation (on a portion of their own land), by the formation of a new slip dock. The working plans were prepared in the spring of the present year, and the work let in May last; and it is now actively progressing towards completion. The slipway is 557 ft. in length, and will be capable of taking in a vessel of 800 tons. The foundation of the slipways is formed of four rows of piles, from the top of the slip down to the extreme end of it, and a portion of these piles will be driven and cut off under water. The upper portion of the ways is formed of timbers laid upon beams of whole logs set across the entire breadth of the slip over the bearing piles, the spaces under the ways between these cross bearers being filled with concrete made of gravel and hydraulic lime. Upon these ways four lines of massive cast-iron rails are laid. The lower part of the slip is formed of an immense raft or platform of timber 210 ft. in length, formed of sleepers of whole logs bound together with diagonals and runners, strongly bolted and trussed to this framing. Upon this a continuation of the ways and rails is formed. Wharfs of stone and timber are constructed on each side of the slip, from which the ships are set, steadied, and adjusted on the cradle. The hauling power consists of Miller's hydraulic purchase, which hauls up the cradle by direct action, without intervention of wheels or machinery. The pumps which work the purchase are driven by a steam-engine. The line of rail which is about to be formed through Partick in connexion with the Edinburgh and Glasgow Railway goes directly past the end of the slip, and a siding will be formed into the dockyard. The contract for the masonry, piling, &c., of this slip-dock were let to Mr. Hugh Kennedy: Messrs. A. More & Sons are constructing the hydraulic purchase; and the proprietors the steam-engine and cradle; the whole of the work being done from the plans and under the superintendence of Messrs. Bell & Miller, civil engineers.——The Maxwell Church, in Pollok-street, is now near completion: the site was given by Sir John Maxwell, of Pollok. The church will hold about 900. The tower and spire, which are about finished, will be about 140 ft. in height. The entire cost will be about 4,000*l*. Mr. O'Donoghue is the architect.

Partick (*near Glasgow*). — The spire of St. Mary's Church is now completed. Its height is about 130 ft., and it is surmounted by an ornamental finial and weathercock. Mr. Maxwell, of Partick, was the contractor, and the architect was Mr. G. H. O'Donnoghue.

Arbroath.—The architect of the projected public hall for Arbroath describes his design as being in the Old Scotch style modernized. The site and locality suit this style of building, he remarks, which is always greatly enhanced when viewed in angle direction. A large gable, with turrets and treble-light window, forms the principal or leading features in the design: by these features the position of the hall is at once marked. A little decoration of an excessively simple kind has been shown on this gable. The height of the building to the eaves of roof is about 40 ft., shop-floor 13 ft., and hall 26 ft.; the supper-room and museum together being equal to hall, or 13 ft. and 12 ft. respectively. The subjoined probable estimate of the cost in erecting a building of this extent is given:—

Mason work	£1,600
Joiner work, including hall seats and open roof	1,500
Slater work	110
Plaster work	135
Plumber work	100
Iron work	160
Glazier work	240
Painter and stainer work	105
Total	£3,950

Perth.—The Commissioners of Police having had their attention directed to the state of the drains, sinks, and cesspools, at Marshall-place, King-street, and King's-place, Perth, by the inspector of nuisances, the superintendent of police has submitted a report thereon, which shows a fearful state of things with regard to drainage in one of the most respectable parts of the town. He concludes his report as follows:—"I am of opinion that before those residing in this locality can expect or ever hope to be free from fever and other diseases well known to originate by the inhalation of poisonous gases generated in bad drains and foul cesspools, the whole cesspool system now existing in the district must be done away with;—that a main drain of sufficient capacity to carry off and drain all water, nightsoil, and sewage, from the kitchens, should be laid down;—that in place of the present square-built drains, through which the sewage oozes and gets out, good fire-clay pipe drains should be put down, through which the sewage cannot escape, but by which it would be carried away from the houses without being lodged about the grounds, and producing those smells which are so offensive, and those diseases which baffle the skill of our best physicians to heal successfully." Mr. John Young, C.E., Perth, has also submitted a report as to the best means of draining the district in question. He estimates the cost of the drain at 1,248*l*.; average cost to each proprietor, 18*l*.

THE POLYTECHNIC.

VERY instructive as well as entertaining is the new lecture by Professor Pepper on the Phenomena of Sound, wherein he brings together a whole century of experiments illustrating various branches of the subject. An arrangement showing on a screen the vibrations produced in reeds when blown through is exceedingly interesting; a complete circle revolving in various planes when sounded in unison; a jumble of forms when discord is introduced; thus showing, as he says, a certain plain gold ring to be literally the symbol of harmony. A speaking head is shown, the voice of a confederate being conveyed through tubes; but we cannot say, with some of the daily papers, that the mystery of the Anthropoglossos now exhibiting in Piccadilly is thereby solved, the latter having no pedestal or other screen for a communicating pipe. The sounds in the latter case *may* be conveyed by a pipe or pipes, but if so it must be done in a much more artificial and ingenious manner than that exhibited at the Polytechnic. There are many other entertainments for the shilling at the Polytechnic, including Paganini's Ghost, which, though no ghost at all, includes a very quaint and curious performance on the violin.

Books Received.

Sussex Archæological Collections. Published by the Sussex Archæological Society. Vol. XVI. Bacon, Lewes. 1864.

The Sussex Archæological is a flourishing society. This goodly volume of between three and four hundred pages contains various interesting papers read at its meetings, including one on the mural paintings in Westmeston Church, first brought under notice in the *Builder*. The paper is by the Rev. C. H. Campion, and is illustrated with coloured and other engravings. There is also a paper on a Romano-British cemetery and a Roman camp at Hardham, in West Sussex; one on Decorative Tiles found at Keymer, by the Rev. E. Turner; and one on the Church Bells of Sussex. All of these are illustrated by engravings. The volume contains various other papers of more or less interest.

The Sussex Archæological Society, we observe, have selected Ardingly for a meeting on the 10th instant, when the members will, in addition to viewing the Church, pay a visit to the family seat of the Culpepers, Wakehurst-place.

VARIORUM.

It is always with pleasure we take up the new number of Dr. Lawson's *Popular Science Review* (Hardwicke, publisher), as we are sure to spend a profitable hour or two with it ere we lay it down, besides returning to it at the first opportunity. The October issue contains an excellent paper by Dr. E. Lankester, on good food, with some wholesome advice to the Bantingites. There is a timely paper on the Metric System, by Mr. J. Spear, with engraved illustrations of decimal measures; and of course various other interesting matters, as on Rock Metamorphism, on Coral, &c.; besides the usual reviews of scientific works, and the very full and valuable scientific summary of the month.——"Transactions of the Institution of Civil Engineers in Scotland, vol. 7th. Glasgow: Bell & Bain. 1864." This volume contains some instructive papers, as on the expansive energy of heated water, by Dr. W. J. M. Rankine; on turned and bored joints for gas and water main pipes, by Mr. J. Downie; on the Glasgow water-works, by Mr. J. M. Gale; on a hydraulic engine for working bellows; and various other subjects. Several of the papers are illustrated by engravings.

Miscellanea.

Yorkshire Art Union.—The Yorkshire Art-Union, under good local patronage, opens its second exhibition in Leeds on this Saturday. The collection contains many works of interest by men of metropolitan and provincial reputation.

Government School of Architecture.—There is to be established, we hear, in connexion with the Royal Engineer establishment at Chatham, a school of instruction in architecture and estimating.

Lithographing by Steam.—A Boston genius has invented a machine from which 600 to 1,000 impressions from stone may be taken in an hour. Formerly it was considered a good day's job, it is said, for a competent workman to produce 250.

Monument to Lessing.—A tower has been erected in honour of Lessing, near his native place of Kamenz, in Silesia, named "Lessing-thurm." It is 64 ft. high, according to our authority, the *Reader;* and there is a fine view from its plateau over part of Saxony, Bohemia, and Prussia.

St. Thomas's Church, Berea, Natal.—The metropolitan bishop of Capetown has consecrated a new iron church at Berea. The building is the gift of Mrs. Danby Harcourt, of Swinton Park, Bedale, Yorkshire, and was originally designed and intended for the neighbourhood of the Congella. The inhabitants, however, being few in number, were unable to raise funds for its erection, and it was removed to its present site,—a spot once occupied as a mission post by the first missionary to Natal of the Church of England. The building is of Gothic form, and is composed of corrugated iron, lined with felt and wood,—having a small vestry, porch, and a spirelet containing a bell. The cost of its removal to its present site, the erection and painting, with extras, has been above 200*l*. It will accommodate about 100 persons.

Plaster of Paris for Paint.—It has been proposed to use ground gypsum instead of white lead as paint for outside work. It is said to be equally or more durable than white lead or zinc white, and if so deserves to be widely known, as the plaster is very cheap and easily obtained. Take equal parts of plaster and white lead, with oil enough to make it the consistency of cream, and run it through a paint-mill.

Growing Bent Grass.—In Lord Palmerston's speech at Tiverton he mentioned incidentally an interesting fact concerning his Irish estate. He had, he said, 1,000 acres of blowing sand there, "where no blade of grass grew;" and "now, in consequence of having assiduously planted that sand with bent, which dies away after it has come to a certain growth, and is followed by grass, I have succeeded in covering the whole of that barren spot with grass."

An Iron Plate.—Messrs. John Brown & Co., of the Atlas Works, have succeeded in rolling an iron plate, 6 ft. by 7 ft., and 13¼ in. thick. The idea of manufacturing so enormous a plate originated, we believe, with Captain Inglis, of the Royal Engineers, with a view of ascertaining if it would be desirable to protect casemates with such a powerful covering. The plate has been forwarded to Shoeburyness, where it will be exposed to a very trying test.—*Army and Navy Gazette.*

The Excavations in Caithness.—Mr. Samuel Laing, ex-Finance Minister of India, has been making farther excavations in the vicinity of Keiss Castle. Amongst the discoveries is part of a subterranean "dwelling, or place of sacrifice," as it is described. It is "built like the Picts' houses, with narrow passages and some small chambers, walled, paved, and roofed over, at a great expense of labour, with large unhewn stones, brought from the beach at some distance." Other "Picts' houses" have also been opened, besides a number of sepulchral tumuli, on the links of Keiss, and skeletons, including skulls, one of which Mr. Laing describes as closely resembling the Neanderthall skull, with excessively prominent mouth or proboscis. Stone implements, shell *débris*, and fragments of pottery, have also been found in connexion with human and other animal remains.

The Salford Albert Memorial.—At a recent meeting of the general committee to arrange for the inauguration of the Albert statue in Peel Park, the mayor reported that Sir Charles Phipps, in reply to a letter on the subject, said that, whilst appreciating the feeling displayed throughout the country in relation to the erection of monuments to the Prince Consort, the public ceremonials connected with their inauguration, gratifying as they were to the Queen, were yet very trying to her feelings; and he was sure it would be most consonant with the wishes of the people of Salford not to give her Majesty the pain of declining any application. It was determined by the committee that the bishop should be requested to present the statue to the mayor on behalf of the corporation. The executive committee submitted a report, in which they stated that they had agreed with Mr. Noble to complete the statue, including the pedestal fixing, and all incidental expenses, for 1,100*l*. It was stated that the statue would be ready for inauguration before the end of October.

Runic Inscription in Cumberland.—Last winter a shepherd discovered an old inscription on one of the large rocks at Barnspike, a long range of crags cresting the hills about three miles to the east of Bewcastle Church. The inscription is Scandinavian, or Old Norse, and may perhaps be read thus:—BARNR HRAITA AT GILLHES BUETH IAS UAS DAUTHR I TRICU ROB TE VAULKS AT FADRLAN NU LLANRGSEL. "Barna cut this in memory of Gillhes Bueth, who was slain in a truce by Robert de Vaulks (*now Vallibus*) for his patrimony, again coveted." The inscription is on the north-west side of a large crag and well protected from the effects of the weather, but is almost illegible. On the top of the crags, a few yards north of the inscription is an old "ring-barrow," in which possibly the bones of Bueth or Barna have been deposited; perhaps those of Barna, as the crags retain his name. A family of the name of Barron were owners of a small estate near the crags, down to a recent period. History and tradition record the Beuths as owners and builders of the castle at Bewcastle (Beuth's Castle); and also as owners or claimants of the barony of Gilsland, this Gilhes Bueth being the only son and heir.

Fall of the Ceiling of a Chapel.—The ceiling of the Primitive Methodist Chapel, Boston, has fallen. There had been service during the evening, and the ceiling fell about two hours after the congregation left. The ceiling joists had been separated from the cross timbers of the roof, owing to being inefficiently fastened in the first instance. The chapel was erected about twenty-five years ago.

The Workmen's Industrial Exhibition, Tunbridge Wells.—This exhibition is said to have been a highly successful one. It has been visited by large numbers of persons. The articles exhibited included not a few specimens of architectural modelling, such as models of Yeovil Church, of Tunbridge Wells Grammar School, and of Huntingdon Chapel as it was and is, by means of one changing model; also of carvings, one of the specimens a cabinet and book done by Lady Caroline Nevill. Many of the exhibitors, however, belonged to the working classes.

Working Men's Club and Institute Union. The secretary to the Union (the Rev. H. Solly) has, during the last fortnight, attended meetings for the formation and resuscitation or encouragement of clubs and institutes in various parts of the country. Amongst the most important of these meetings we may mention those at Winchester, Southampton, Scarborough, Bradford, and Leeds. At a recent meeting of the secretaries of the London clubs, Mr. Sales described the nature of the scheme now being extensively carried out by the Ladies' Sanitary Association for instructing the working classes in lectures illustrated by selections from the Economic Museum, collected at Twickenham, and belonging to Mr. T. Twining.

Ascent of Salisbury Cathedral Spire.—On the 28th ult. James Matthews, a workman in the employ of Mr. Frederick Richard Fisher, builder, of the High-street, performed his annual feat of ascending to the summit of Salisbury Cathedral spire, for the purpose of oiling the vane. The spire, as is well known, is upwards of 400 ft. high; but, notwithstanding this altitude, he, with the utmost possible coolness, mounted the cross above the vane, and turned the latter round with his foot as he sat upon it. The ascent from the weather door is accomplished outside by means of twenty or more small iron handles, firmly fixed to the spire.

The Statue discovered in Rome.—Signor Righetti having succeeded in exhuming the colossal bronze statue at last, the opinion of its representing a young Hercules, according to the Roman correspondent of the *Morning Post*, is confirmed by several circumstances, among which is that of a lion's skin forming part of the base. The feet are detached, but are fortunately not wanting. The height of the figure is 4 metres 25 centimetres, consequently superior to that of the Marcus Aurelius. The Marquis Marini has relinquished all claim to a share in the prize, there being a clear intervening space of half a foot between the base of the statue and the commencement of his property. The Government has no claim on the treasure either, reserving to itself only the right of purchase at an equitable valuation. It appears that the statue will be bought for the Vatican Museum, and placed in the centre of the octagonal or Belvedere Court, which will be fitted with a glass roof on purpose. The actual value of the bronze is calculated at about 3,000 scudi, and that of the gilding on it at 1,000 scudi more, but it is conjectured that 100,000 scudi (21,000*l*.) will not be considered an out-of-the-way price for the statue.

Stone-crushing Machine.—A new machine, manufactured as Blake's stone-crushing machine, by Mr. H. R. Marsden, of Leeds, has been patented in Great Britain and in several foreign countries. It is designed to break stones into fragments, to be used for road-making, railroad ballasting, concrete, or other purposes, and to crush ores or minerals, break flints for crockery-ware, &c. Every revolution of a crank causes the lower end of a moveable jaw to advance towards a fixed jaw about a quarter of an inch, and return. Hence, stones dropped in between the convergent faces of the jaws are broken by a succeeding bite, and the fragments then fall lower down and are broken again, and so on until they are made small enough to pass out at the bottom. The distance between the jaws at the bottom limits the size of the fragments, and may be regulated at pleasure. The machine can be made of any size. The usual length of the machines is from 8 ft. to 8½ ft.; height to top of wheels, 5 ft.; width, from 4 ft. to 5 ft.

Stonecutters' Strike in Dublin. — According to the *Dublin Builder*, a serious strike has taken place in that capital, the cause being the asserted right of the stonecutters to set out stonework as well as work it, which the brick and stone layers equally claim as their prerogative. Tendency being towards the latter, the stonecutters have struck.

The late Mr. Charles Winston.—Many of our readers will hear with great regret of the death of Mr. Winston, well known by his publications on stained glass, and his endeavours to improve the manufacture of glass. Mr. Winston died suddenly in his chambers in the Temple, on Monday last. At the inquest, Mr. Tomlinson Brookes, surgeon, deposed that he believed death was the result of disease of the heart, produced by over-work and prolonged abstinence from food. Mr. Winston was deputy County Court Judge, and was only forty-nine years of age.

Worcester Diocesan Architectural Society. The members of this society and their friends have made an excursion to Lichfield, for the purpose of inspecting the cathedral of that city, recently restored and re-arranged under Mr. Scott's direction. The party proceeded from Shrub-hill station to Dudley, and thence by the South Staffordshire line to Lichfield. In order to allow more time for the inspection of the cathedral, a contemplated visit to St. Chad's Church, which is situate at some little distance from the city, was abandoned; and the excursionists went direct to the new Free Public Library and Museum, which contains an interesting (though small) collection of antiquities, casts, specimens of natural history, &c. A party of about forty visited the cathedral. Canon Hutchinson accompanied them, and pointed out the principal objects of interest. The annual meeting of the society and an excursion to Norton, Stoulton, and Pershore, were to take place on Tuesday.

Value of Property in Lombard-street.—The banking premises of Hayward, Kennard, & Co., in Lombard-street, were purchased some seven or eight months since, by the Mercantile and Exchange Bank, for 20,000*l*. The house in question has a frontage of but 54 ft., by a depth of perhaps a third less; but the situation is admirable, being in the very centre of what is termed the banking world. It is stated that the directors of the Mercantile and Exchange Bank soon perceived that they had got a bargain, as they let the first floor of the house to the Asiatic Banking Corporation for 1,000*l*. a year. The amalgamation of the London Bank of Scotland with the Mercantile and Exchange Bank having made it necessary to value the premises in Lombard-street, the directors of the Bank of Scotland have just paid 10,000*l*. to the shareholders in the Mercantile and Exchange Bank; as their proportion of the increased value of the premises, which are now estimated as worth 40,000*l*.! The value has thus been doubled within the year.

Monumental.—A carved head-stone has been recently put up in the Coventry Cemetery. The design exhibits a sunken panel with a mourning border of black marble, at the four corners of which are four varieties of flowers, the rose denoting bloom and health; convolvulus, delicacy and frailty; poppy, sleep and death; and heartsease, rest and peace everlasting. The recording angel is shown in the centre of the panel as having inscribed the date of decease, and in the act of ascending through a stream of light to the final resting-place. The panel in the pediment has a medallion profile of the deceased, and filled in with foliage. The design is by Mr. V. Wyatt, of London, and the monument was executed by Mr. R. L. Boulton, of Worcester.——A monument has recently been erected in the inner chapel of South Carlton Church, Lincolnshire, by Lord Monson, in memory of the late Lord and Lady Monson, and some other members of the family. This monument, which is of Italian workmanship, is an almost exact copy of one erected in the year 1652 in one of the side chapels in the church of the Santissima Annunziata at Florence, by Florentine Foggini. The Monson monument has been executed at Florence in the studios of the sculptors Bencini and Bartolini, under the direction of, and from drawings and models prepared by, Signor Insom, with the permission of the clerical authorities. It is somewhat smaller than the original, but of similar proportions, and is affixed to the west wall of the inner obituary chapel.

Fever at Liverpool.—The prevalence of fever in the town was the principal subject of discussion at the meeting of the Health Committee last week. Mr. Alpass and the other members of the deputation who attended the Social Science Congress at York seem to have returned strongly impressed with the advisability of establishing places for disinfecting the clothes of fever patients by means of hot air. It is certainly time something was done to check the epidemic. The increase of fever, according to the local *Mercury*, is quite startling. In the week before last there were 207 patients in the workhouse hospital, and that was an exceptionally high number, but last week there were no fewer than 260.

Improvement of Lincoln's-Inn Fields.—Sir: In these days of development of national taste and improvement of all sorts, when London and Paris are emulating each other as cities contending for the palm of attraction to the foreigners, would it not be an improvement to the much-frequented though somewhat dreary Lincoln's-inn-fields, if the benchers—or those with whom the power lies—were to remove the long ugly west wall of their gardens, which separates them from the "fields," substituting in its place a suitable iron fencing? This would throw open to view the hall and library, improve the general aspect of the locality, and the circulation of air. Although the local residents are but a scanty few, there are few parts of the metropolis more frequented by men of business from all parts of the kingdom than Lincoln's-inn. Such an opening, too, on the score of health, a point in which we are all interested, would be desirable, as a boon to the crowded population dwelling in and around Clare Market on the one side, and the Holborn purlieus on the other,—people who know of no "vacation" or "out of town" whereby to give their lungs and brains a seasonable airing.—Curling Wig.

Exports of the United Kingdom. — The official accounts of the export trade show an increase in the month ended 31st August, from 14,088,814*l*. in 1863, to 16,274,269*l*. in 1864; and on the eight months, ended 31st August, from 89,751,851*l*. in 1863, to 108,716,219*l*. in 1864. Flint glass has increased in the eight months, from 62,653 to 71,625 cwts.; machinery (other than steam-engines), from 1,608,872*l*. to 1,933,850*l*.; pig and puddled iron, from 312,805 to 320,410 tons; wrought-iron, from 71,801 to 72,380 tons; unwrought steel, from 17,945 to 19,992 tons; telegraphic wire and apparatus, from 92,580*l*. to 163,804*l*.; red and white lead, and litharge of lead and lead ore, from 4,465 to 4,571 tons; and painters' colours, from 299,061*l*. to 340,052*l*.; but window-glass seems to have fallen off from 42,783 to 41,572 cwts.; and plate-glass, from (in value), 44,590*l*. to 42,971*l*.; steam-engines, from 1,030,469*l*. to 998,125*l*.; bar, angle, bolt and rod iron, from 214,572 to 200,319 tons; railroad iron, from 321,231 to 295,887 tons; iron castings, from 58,738 to 46,375 tons; hoops, sheets, and boiler plates, from 89,657 to 83,418 tons; lead, pig, rolled, sheet, piping, tubing, and lead shot, from 26,106 to 22,605 tons. The figures, taken as a whole, however, are considered to be extremely satisfactory.

Masters taking their Workmen into Partnership.—The *Glasgow Times* says:—"The dawn of a new era—a partnership of capital and labour—between master and workman has been inaugurated, the following facts regarding which have been communicated to us from a source on which we can rely:—The old and respectable firm of Messrs. Spence & Wilson, flint-glass manufacturers in York, having lately increased the wages of their workmen from 10 to 15 per cent., have since then taken an inventory of their works and stock-in-trade, which have been valued at 100,000*l*. The old partnership has been converted into a limited liability joint-stock company, one half of the capital being taken by Messrs. Spence & Wilson, 47,000*l*. otherwise taken in shares, and 3,000*l*. placed to the credit of their workmen; which arrangement was duly communicated to the secretary of the Flint Glass-makers' Society in the York district, who is one of the *employés* in the works. We also learn that the representative of the working-class partners in the York Flint Glass Company (Limited) was informed that the workmen might expect to realise at least 300*l*. per annum as their share of the profits, to be divided yearly among them in proportion to their respective wages, and thus carrying out the co-operative principle of giving dividends according to merit."

Hereford Drainage.—The Letton drainage works, which were commenced in May last by Messrs. Brassey & Field, having been completed, Mr. S. Barlow, sub-contractor, gave the whole of the men employed under him, about 200 in number, a dinner, at the Swan Inn, Letton.

Welding by Hydraulic Pressure.—A series of experiments have lately been made at Paris, by M. Duportail, engineer, in the workshops of the Western Railway, to ascertain whether iron might be welded by hydraulic pressure, instead of by the sledge-hammer. The latter, indeed, has not a sufficient impetus to reach the very core of the metal, while continuous pressure acts indefinitely to any depth. In the experiments alluded to, M. Duportail caused two iron bars, 1½ in. in diameter, and heated to the welding point, to be placed between the piston and the top of an hydraulic press. The bars were welded together by this means with extraordinary ease, the iron being, as it were, kneaded together, and bulged out at the sides under the pressure. The action of the press was suspended when the part welded was brought down to the thickness of the bars. After cooling, the welded part was cut through, to examine the inside, which was found perfectly compact. To try it, one of the halves was placed under a forge-hammer, weighing 1,800 kil., and it was not until the third stroke that the welding was discovered.—*Galignani*.

TENDERS.

For the erection of convent, Notre Dame, Plymouth. Mr. Jos. A. Hansom, architect. Quantities by Mr. Fred. Chadwick:—

Elliott	£6,396	0	0
Hill & Keddle	5,960	0	0
Henshaw	5,871	0	0
Sawyer	5,825	0	0
Harvey	5,794	0	0
Hart	5,720	0	0
Jones	5,700	0	0
Lethbridge	5,687	0	0
Call & Pethick	5,674	0	0
Finch	5,576	0	0
Bishop	5,300	0	0
Hallet & Jenkins	4,970	0	0

For the erection of a new tap, and rebuilding the Spread Eagle Hotel, at Gloucester, for the Spread Eagle Hotel Company. Messrs. Medland, Maberly, & Medland, architects:—

Coleman	£9,650	0	0
Jones & Co.	8,500	0	0
King & Godwin	8,470	0	0
Shepherd & Meredith	8,228	0	0
Estcourt (accepted)	8,100	0	0

For Abbey Mill pumping engines, Main Drainage of the Metropolis:—

Maudslay, Son, & Field	£134,228	0	0
Slaughter & Co.	112,500	0	0
Fleming (for Morrison & Co.)	111,000	0	0
Williams, Harvey, & Co.	88,700	0	0
Harvey & Co.	88,000	0	0
Sandys, Vivian, & Co.	87,000	0	0
Adamson & Co.	82,590	0	0
Forrester & Co.	78,450	0	0
Dagleish & Co.	70,560	0	0
Watts & Co.	60,900	0	0
Rothwell & Co.	54,570	0	0

[By the above there appear to be blind engineers, as well as blind builders—in fact, either the lowest tenderers have made a mess of it, or the highest ones know what profit is.]

For additions to Garrick's Villa, Hampton, Middlesex, for Mr. Edward Grove. Messrs. Porter & Markham, architects:—

Rhodes	£1,157	0	0
Little	1,129	0	0
George	1,112	0	0
Lathey, Bros.	992	0	0
Bates	972	0	0

For proposed additions to Belair House, Dulwich, for Mr. Chas. W. C. Hutton. Mr. Robert M. Shaw, architect:—

Jennings	£2,967	0	0
Patrick & Son	2,773	0	0
Fish	2,723	0	0
Marsland & Son	2,695	0	0
Lawrence & Sons	2,609	0	0
Brown & Robinson	2,505	0	0
Brass	2,389	0	0
Wills	2,343	0	0

[Advertisement.]

CHURCH, TURRET, and STABLE CLOCKS. J. W. Benson, having erected steam-power and improved machinery for clock-making, at the manufactory, Ludgate-hill, will be glad to furnish to clergymen, architects, and committees, Estimates and Specifications of every description of Horological Machine, especially cathedral and public clocks, chiming tunes on any number of bells. A descriptive pamphlet on Church Clocks post free for one stamp. Watch and Clock Maker by Warrant of Appointment to H.R.H. the Prince of Wales, and maker of the great clock for the Exhibition, 1862. 33 & 34, Ludgate-hill, E.C. Established 1749.